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School for Machine Typesetting

OF THE NEW YORK SCHOOL OF PRINTING

J. Henry Holloway, *Principal* Thomas J. O'Connell, *Instructor*

THE TYPESETTING MACHINE KEYBOARD

The average student who wishes to take up the operation of typesetting machines usually burns with impatience to sit at the keyboard and watch the slugs come out. Without the proper preliminary training, this is as senseless as sitting at the piano and picking out one-finger tunes.

As knowledge of music and fingering are necessary before playing, so knowledge of the keyboard and machine are necessary before setting type mechanically. The typesetting machine itself is as much a compositor's tool as his stick or gauge. It is as nearly perfect mechanically as is possible to manufacture. The machine is competent to do its work in the hands of a competent operator.

However, certain basic qualifications must be possessed by one who desires to become a proficient operator. Without these things, proficiency cannot be attained.

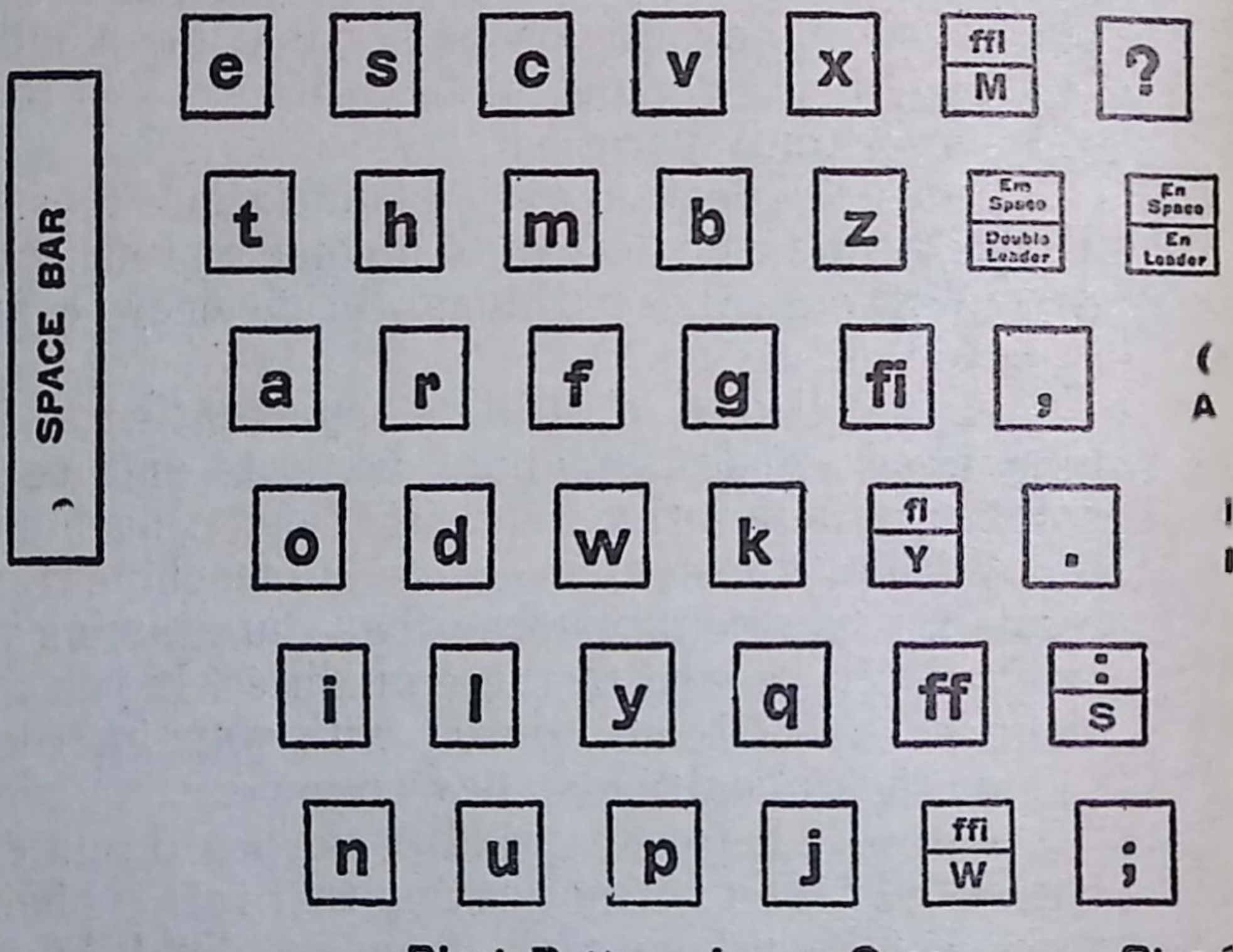
A knowledge of spelling, punctuation and grammar, good eyesight, manual dexterity and mechanical ability are imperative requisites for the machine operator. Without these, time devoted to machine training is wasted. It is strongly urged that you examine yourself critically in regard to these qualities. If you are deficient in any of them, consult with your instructors as to how the difficulty may be overcome.

Now sit before a practice keyboard and examine it carefully. You will notice that there are six horizontal rows of fifteen keys each. They are divided into three

color groups of black, on the left; white, on the right; and blue, in the center. The black keybuttons are used to obtain all lower case letters and ligatures. Due to the construction of the matrix, kerned letters will not break on a slug, as they do in hand set type, but you are cautioned to remember that on the machine, ligatures are to be used just as they would be in hand set type. Observe that on three of the black keybuttons there are two characters as: **fl-Y ffi-W** and **ffl-M.** The reasons for keys having double characters will be gone into in a later lesson. For the present, it will be sufficient to

Standard Keyboard Lay

Chart 1 This is the standard Linotype and Intertype layout for the use of a combination of head-letter and straight matter. This chart is g able for practice work if hung in front of the dummy keyboard or machine or fairly proficient do the sentence exercises by looking at the chart instead of seldom a thought of the keyboard.



Black Buttons—Lower Case

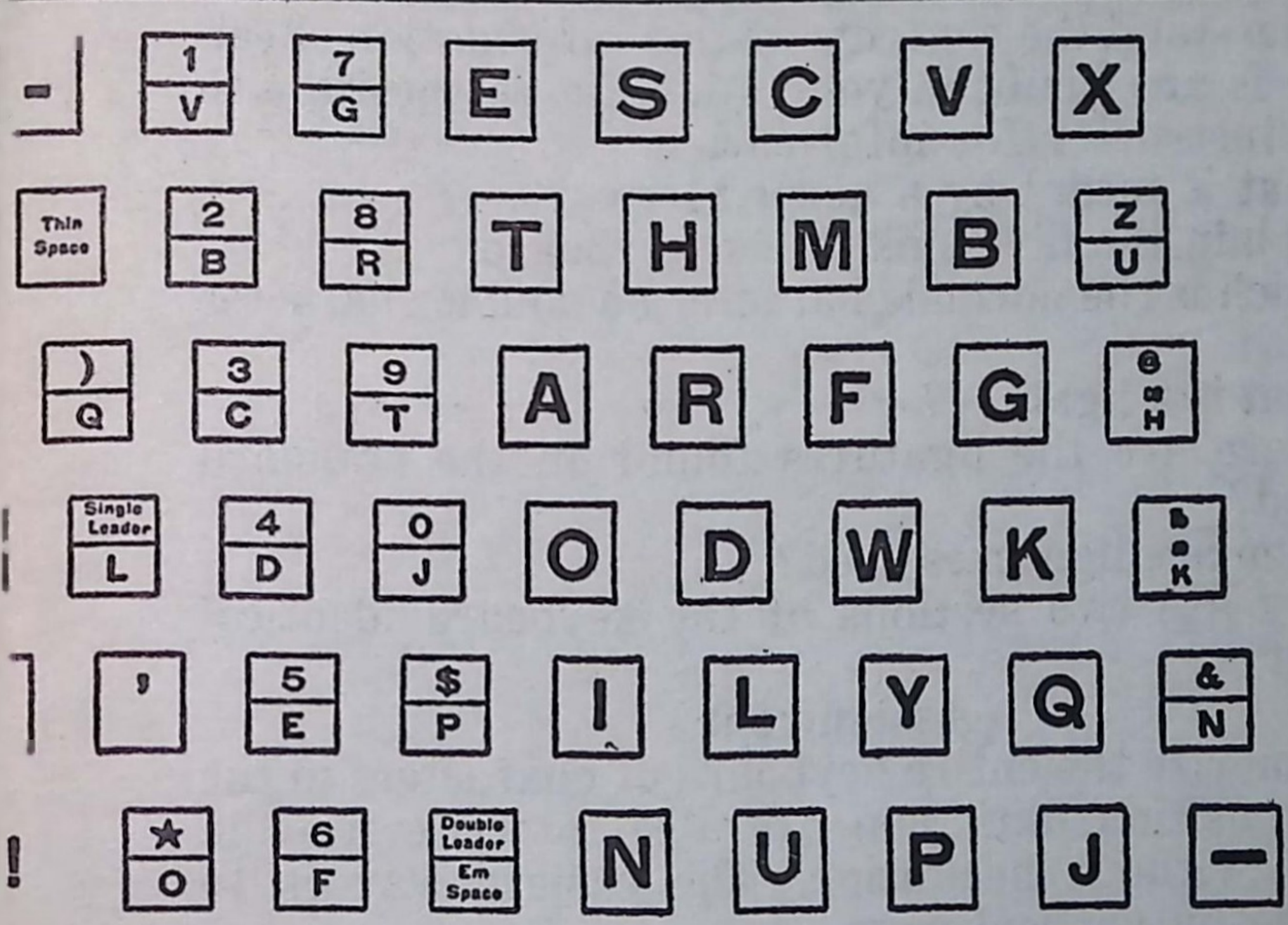
Blue

remember that on all keys, the upper character (the normal position) is the one which will be obtained if that button is touched.

Proceeding to the right section of the keyboard, we find the keybuttons of the last five rows are all white. Observe that with the exception of the right hand vertical row, the layout of the white and the black keys is identical both vertically and horizontally. The white keys are all the capital letters with the addition of a few commercial signs and the one-em dash (—). This identical layout makes it possible to set capitals as

ıt for Two-Letter Machine

o-letter matrices with italic and small caps. It can also be used for head-letter or n for reference and study when away from the keyboard. It will also prove valu- level with the eyes. First study and memorize the location of the keys. When e keys. Through practice you will acquire an easy smooth, rapid motion, with



ns–Points and Figures White Buttons–Capitals

readily as lower case, once the arrangement has been memorized.

The center section of the keyboard whose keys are blue, contains marks of punctuation, spaces, figures and characters all of which should be familiar to you except, perhaps, the fourth key down, in the second row. The down stroke, as this character is called, is actually a hairline rule, the use of which will be further explained in tabular composition work.

Just to the left of the keyboard and parallel to it, will be seen an elongated bar. This is the spaceband key, which when touched, places self-justifying spaces between words, or wherever else wanted. On the Intertype machine, there is an additional spaceband key on the right hand side of the keyboard. This is also found on the early models of the Linotype and is used for greater convenience in the setting of all capital work.

Questions

The purpose of these questions is to be sure that you understand the contents of this information sheet. If there is any doubt in your mind, do not hesitate to ask the instructor for information.

What is meant by a kerned letter?

Explain the divisions of the keyboard.

Which is the normal character on double character keys?

What is a ligature?

Where are the ligatures found on the standard keyboard?

When are ligatures used?

Why are two sections of the keyboard identical in layout?

Assignment

Memorize the entire keyboard of characters in the normal position until you are able to write it from memory without hesitation. The easiest way is to memorize by vertical rows.

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KEYBOARD MANIPULATION

In the previous lesson, you became familiar with the general layout of the keyboard, and are now ready to begin its manipulation. There are certain physical features about operating to which careful attention must be given, since in the final result they will make the operators work seem easy or difficult. All attention given to these features has one common aim, which is to reduce the physical strain attendant upon operating over long periods of time, while increasing the amount and cleanliness of the output.

First, about the position of the body at the keyboard. While you may have observed operators in all positions, from nearly flat on the back to hunched over the keyboard, extended observations will indicate that these positions are only temporarily assumed, in order to relieve the strain on the various parts of the body which has been brought about through maintaining a rigid posture over an extended period. When you are operating, relax, be comfortable. The best way to do this is to assume an upright position in the chair, with the shoulders well back, but not rigidly so. The head should be inclined forward very slightly but not dropped to a peering position. If you seem to find it necessary to get your nose right down to the keyboard, it would be well to have an eye examination, since this posture indicates an eyestrain which will leave a headache at the end of the day.

Place your chair squarely before the keyboard so that the first two rows of black keys are approximately centered before your body and at right angles to it. Bring the chair up until the keyboard is about six inches from your body. Let the arms hang down naturally at the sides from shoulder to elbow. Raise the forearms so that they are parallel with the keyboard. With the wrists in line with the forearm, see if without stretching or drawing back, you can place your left thumb on the "i" button, and your right thumb on the "l" button. If not, move the chair back or forward, until you can assume this position without any strain. With the hand open, and fingers slightly spread, but relaxed, this should bring the second finger of the

left hand over the "t" button and the index finger of the right hand over the "r" button. This is called the base position to which the hands should return after any pause. The purpose of this base position is to give the hands a fixed starting point from which they can automatically be moved to other positions without the necessity of glancing at the keyboard.

Let your fingers touch any of the keys. Notice how little pressure is needed to depress them. It is not necessary to pounce or pound on the keyboard to get results. A very light touch, with no more than the weight of the finger is sufficient. The striking motion is from the knuckle to the tip of the finger, the whole finger being depressed. Neither the wrist nor forearm have any part in this motion, except to bring the fingers into operating position. Do not allow the finger to rest on the key since the construction of the machine is such that matrices will continue to drop as long as the key is held down.

For double letters, strike the key twice rather than hold it down. The reason for this is that the keyboard speed of different machines may vary widely and in such a procedure the tempo to which you familiarize yourself on one machine may be utterly unsuitable to another. The hands should move smoothly and without jerking from one position to another. There is an unhurried rhythm in operating which marks the swift operator, whose smooth movements appear deceptively slow, but turns out a long string with effortless ease.

It is inevitable that the beginner will frequently glance from the copy to the keyboard, but with continued practice this will become less necessary, until he reaches the desired point where it is no longer required. The training of the eyes must be co-ordinated with the training of the fingers, and the sooner this is accomplished, the more satisfactory will be the string, in both amount and cleanliness.

Studies of eye motions made recently indicate two principal actions. The casual reader's eye takes in a group of words whose meaning is flashed to the mind as a unit. Studies of the eye motions of proofreaders, however, show that they move more slowly, taking in smaller groups of words, and further, in difficult or unfamiliar words they take in syllables, hesitating where unusual combinations occur. This is the training which is desirable for operators. The first step is to get the eye focused on the copy, and away from the keyboard. The next, to have the eye hesitate only on difficult combinations.

The purpose of giving the following explanation is to show the necessity of following an undeviating method in touching the keys when learning to operate.

What the eye perceives, is carried on the optic nerve to the brain. In the brain an impulse is sent out along a neuron to the spinal column and thence to the fingers.

These neurons may be likened to large rivers with delta mouths, which run into each other. If water escapes through numerous mouths, none of the escaping channels will be very deep. But, if only one exit is permitted, the channel is scoured out by the water's force. The mind acts in the same manner. If the eye perceiving a capital "A" sends that impression to the mind, and the brain in turn, carries the message of striking that key to a different finger each time, no fixed response will result from the sight of the letter. If, however, each time the eye perceives this "A" a message is carried to one finger only, to strike that letter, there is set up in the mind a short-circuit, known as a conditioned reflex, so that in time, the sight of the letter, without further thought, will automatically move a given finger to touch a given key button.

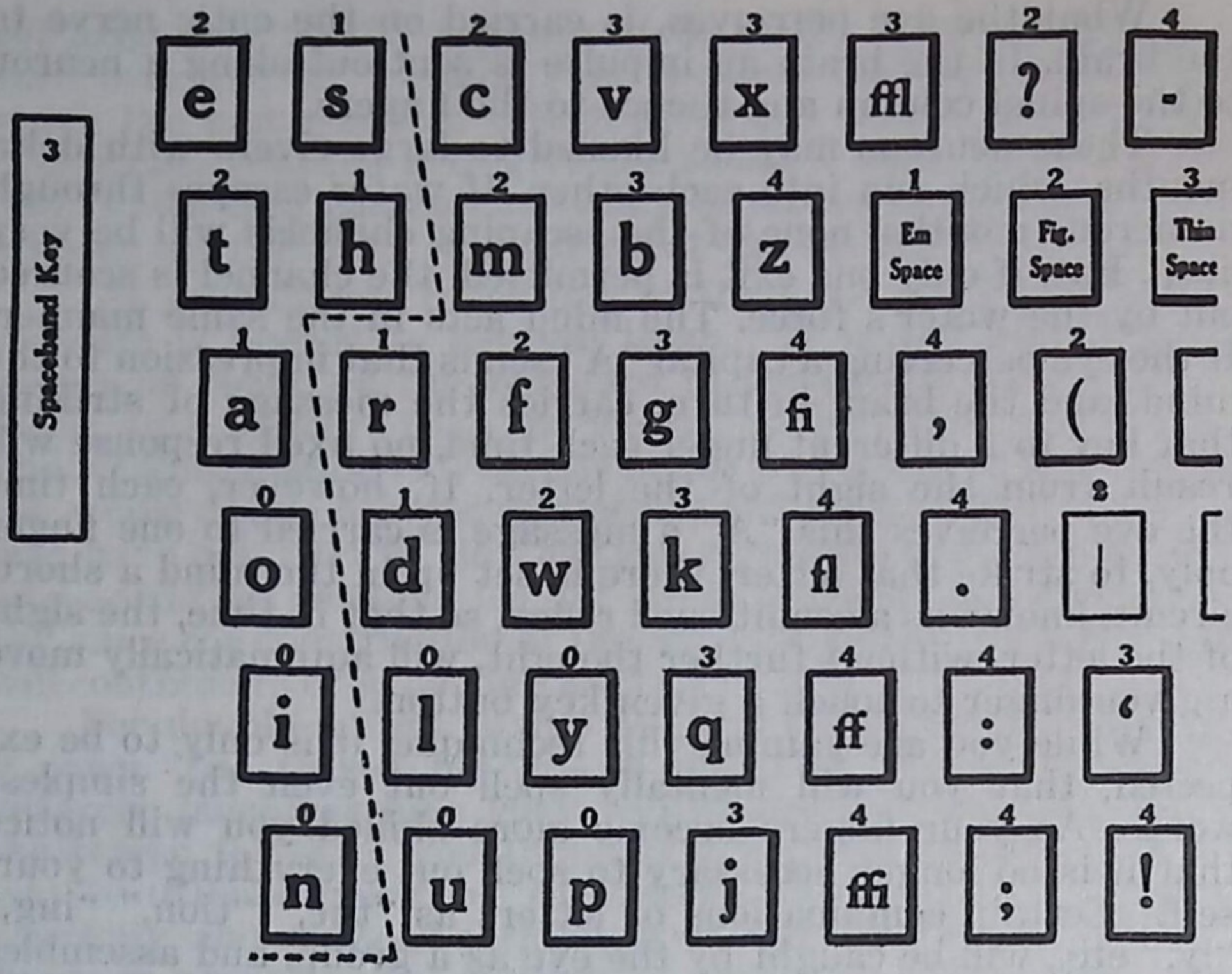
While you are gaining this technique, it is only to be expected, that you will mentally spell out even the simplest words. As your fingers become more skilled you will notice that it is no longer necessary to spell out everything to yourself. Certain combinations of letters as "the," "tion," "ing," "ly," etc., will be caught by the eye as a group, and assembled by the fingers as a group. This ability should be striven for willfully and when it is attained, an absent-mindedness settles over the mechanical act of operating. The eye takes in a group of words, and roves elsewhere about the machine. The fingers function correctly without effort. The mind is almost entirely free of the copy and concentrates on the sound of machine actions. When you reach this stage, you're a swift.

The first step toward the goal is contained in the accompanying chart which shows the assignment of fingers to the keys. The dotted line divides the keys touched by the left hand from those touched by the right. The small figure appearing over the key button indicates the proper finger to use as (1) first finger; (2) second finger, etc., and (0) the thumb.

The keyboard on this sheet is the commonly used job layout and differs from most newspapers in that all ligatures are used in job work. In the newspapers, the ligature channels usually carry fractions in the ffi and ffl channels.

ASSIGNMENT

Going down the columns, practice the following words over and over, until you can strike the keys with the proper fingers as indicated on the chart, without looking at the keyboard. After each word, strike the spaceband key.



see	tie	cover	draw	would
set	then	brow	dowager	undulate
sees	son	brave	forward	punish
test	nose	conserve	wigwam	nuptial
he	thin	fear	arrow	tulip
she	cat	bare	know	poppy
these	cost	cabaret	knock	quintet
at	coat	grave	work	liquor
hat	case	goose	awkward	quotient
ate	vat	aggravate	flower	quake
hate	vase	game	fling	quintal
sat	cane	gaze	flemish	quaff
sheet	came	zebra	flirt	puff
estate	come	haze	dollar	offer
that	mat	maze	linden	afford
haste	motive	fizz	willow	jonquil
those	convex	first	wild	tulip
shoe	extent	firm	yellow	trojan
shot	hex	fish	wily	adjust
host	combine	dot	yodel	affirm
his	combat	madam	lily	office
this	base	dame	under	raffle
sit	bane	dram	your	affluent

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MACHINE ACTIONS

The **typecasting machine** casts lines of type or **slugs** instead of individual types such as are used for hand composition. The slugs are cast from **matrices** punched with the various characters needed for type composition. After the line of matrices has been assembled and the slug has been cast, the matrices are returned automatically to a **magazine** until they are needed again.

The machine may be thought of as a combination of three machines put together: one for assembling, for casting and for distributing. Throughout the machine every part is named for the function it performs, and as the operator faces the **keyboard**, the parts are further designated as right, left, front or back.

When the operator depresses the **keybuttons** a release mechanism permits the matrices to escape from the magazine and they drop down the front of the machine, being guided by the **assembler front cover** and the **assembler front partitions.** They drop on the **matrix delivery belt** which conveys them to the **assembler chute** where they pass over a **star wheel.** Both the matrix delivery belt and the star wheel (which are connected by a chain of gears) may be stopped by pushing in on the **assembler driving belt shifter.** The star wheel pushes the matrices down and across in a retaining **assembling elevator.** As the matrices are assembled they are prevented from moving too fast by the **assembler slide** which in turn is restrained by a pair of **brake shoes** which press against it at an angle. The slide can be released by depressing the **assembler slide brake trip.** Touching the **spaceband key** permits the **spacebands** to drop out of the **spaceband box.** Spacebands serve two main purposes: they separate the groups of matrices which form the words, and they **justify** (spread out) the lines so they will all be of even length. A spaceband consists of a short **sleeve** and a long **wedge,** the inner surfaces of which are tapered. The **ears** of the spacebands rest on the top of the **assembling elevator gate,** the sleeves rest between the word groups, and the long wedges hang about two inches below the matrix line.

When a sufficient number of matrices and spacebands are assembled in the line, it is sent to the casting mechanism by pushing down gently on the **elevator lever handle** with the right hand. Do not send the elevator up with too much force as this will pi the line of matrices. When the assembling elevator has been raised to its highest point it releases the **line delivery slide.** The line is now grasped between the line delivery **long finger** and **short finger** and delivered to the **first elevator jaws.** As soon as the slide begins to carry the line away, drop the assembling elevator by letting go of the handle. Do not watch the delivery slide which will return automatically to its normal position.

When the line has been grasped by the first elevator jaws the **first elevator slide** descends to the **vise cap.** As it does so, the **mold disk** makes one-quarter revolution bringing to casting position the **mold** in which the slug will be cast. The mold contains a cavity the size and length of the slug to be cast. The back of this cavity aligns with a passage leading from the **metal pot,** which is filled with molten metal. The first elevator presents to the front of the mold cavity that part of the matrices in which the characters are punched. The mold advances against the matrix line, and the metal pot, which also moves forward, locks against the back of the mold. At this point, the spacebands, which are held by the ears, have their long wedges driven upward by the **justification block** which is just below them, thus expanding the space between the words and filling out the balance of the line. Now the **pot plunger** descends, forcing the molten metal into the mold cavity, casting a slug which bears characters as they are arranged in the line of matrices.

After the cast, the plunger moves up, the pot moves back, the mold disk moves back and the spacebands drop to their original position. Although a number of things now happen, in order to simplify the matter, we will only consider the action of the mold disk. After moving away from the line of matrices, it begins to revolve counter clockwise, and as it does so, a **back knife,** pressing against the back of the mold, trims off the **sprue,** or irregularities on the base of the slug which were left by the casting process, bringing the slug to type high (.918 inches). Continuing its revolution, the mold disk makes three quarters of a turn which brings it back to its original starting point. The disk now makes a forward, and then a backward movement. When it moves forward, an **ejector blade** pushes the slug out of the mold, forcing it between the **side trimming knives** which give the slug the desired thickness.

While the slug was being trimmed and ejected, the first elevator slide, carrying the line of mats and bands, was rising to the **transfer channel.** At the same time the **second elevator** swings down from the **roof** and comes to rest on the transfer channel. The matrix line is now transferred from the first elevator jaws by the **transfer finger** which, fitting inside the jaws, pushes the line to the right. At the same time, the **spaceband transfer lever** moves to the left. These two levers now retreat a few inches and as the first and second elevators move away, the levers come together again, pushing the spacebands into a group. The bands, now caught under the **spaceband transfer lever pawl,** are returned to the spaceband box, ready for re-use.

When the line was transferred as just described, the matrices were lifted out of the transfer channel because their **teeth** were engaged by the V-shaped **second elevator bar.** The spacebands, having no teeth, remained in the transfer channel. The second elevator lifts the matrices up to the roof, and as it does so, **a distributor shifter** moves out and then in again, pushing the matrices from the second elevator bar into the **distributor box.** Here they are lifted up one at a time by the **distributor box lift** and three of the lugs of each matrix (two upper and one lower) are engaged by the **distributor screws.** Parallel to, and inside the distributor screws is the **distributor bar.** The teeth of the matrices are engaged by the distributor bar just as they were by the second elevator bar, but where the latter has all its teeth, the teeth on the distributor bar are cut away at various points. This cutting away of teeth on the bar or on the matrices is called the **combination** and when the cut away portions on a matrix matches that on the bar, there is nothing to hold the matrices on and they drop off, falling into the **channel entrance** from which they drop into the magazine, ready for re-use.

Assignment

Read over this sheet, paying particular attention to the names of the parts in bold face. Be sure that you understand every statement in this sheet before proceeding with the balance of the assignment. If there is any doubt in your mind, about the meaning of any part, do not hesitate to ask an instructor for further explanation before proceeding.

Open the assembling elevator gate and pull the assembler slide to the left as far as it will go. With the index finger of your right hand, release the assembler slide brake, allowing the slide to return to its normal position. Repeat this until you are thoroughly familiar with the operation of these parts.

Grasp the control lever and pull it forward gently until you feel it push against your hand. Allow it to continue forward as far as it will go, but do not draw it out to its extreme position. Do not operate this lever violently or pull it beyond the position it will take if allowed to come forward of its own accord. Push the lever all the way in again and repeat until you are familiar with its action. Finish this exercise by pushing the control lever all the way in.

Turn on the motor switch and pull the assembler belt shifter knob out and push it in again. Repeat this several times until you are familiar with its operation.

Set a sufficient number of words in this paragraph for a line. Read the line of matrices in the assembling elevator. If any errors have been made, correct them.

Send the line to the casting mechanism. After the line has stopped inside the elevator jaws, bring the control lever forward starting the machine.

After the machine has come to a stop, push in the control lever and repeat.

At the end of the session, turn off the motor switch but be sure not to turn off either the heat or the lights.

Safety: Release the assembling elevator lever as soon as the line begins to move away. Do not put your hand in any part of the machine when it is in motion.

SPACING ON TYPESETTING MACHINES

The appearance of the printed page is greatly affected by the care used in its spacing, and whatever factors are considered in proper word spacing of hand-set matter apply with equal emphasis to machine-set type. Because the machine is a method of setting type more quickly, there is no reason to sacrifice principles of good typography merely to obtain a greater output. All lines should be spaced as evenly as possible by filling the assembler with the same amount of material as closely as practical. An occasional glance at the galley will show any objectionable holes or rivers which need resetting. Try to avoid beginning or ending more than two lines with the same word or mark of punctuation.

The generally accepted rules for paragraph indention should be followed in machine composition, unless office style or author's demands indicate otherwise. This ordinarily calls for an em quad of the size of the type being set, up to and including 18 picas; from 19 to 24 picas an em and a half; 25 to 30 picas, two ems. This is for 8 to 12 point, with more indention for smaller sizes, and less for the larger faces of type.

On typesetting machines, spacing is made almost fully automatic through the use of spacebands, which are made of two parts. The longer part or body is tapered, being narrow at the top and wide at the bottom. The upper part of the spaceband, or the sleeve, is also tapered to exactly the same angle as the body, but the direction of the taper is reversed. This means that when these parts are slid on each other, the outside edges are always exactly parallel.

Justification takes place in the machine, by holding the upper lugs or ears of the spaceband immovable while the body is driven upward, expanding the space between the groups of matrices on each side.

The lines of bands and matrices must be tightly pressed together in the casting position in order to prevent metal seeping between them. To assist this action, the bands are tapered .0005 inches wider at the casting edge than at the front edge. It is therefore important that all bands be placed in the machine with the casting edge in the proper position, that is, fac-

ing toward the back of the machine. This will be accomplished if the short part, or sleeve, is always placed to the operator's right when the bands are put in the machine. When you pick up a group of spacebands, look at the bottoms. Notice that the left side is rounded off to minimize wear on the matrices, while the right side is flat. This enables you to immediately spot a reversed spaceband. Failure to face the bands correctly will result in hair lines and the breakdown of the side walls of the matrices.

Never place two bands together in a line

A single spaceband will drive up parallel between two adjacent matrices. But if two spacebands are put together with no matrices between them, the heavy bottom tapers, rubbing on each other, will prevent the top, or sleeve parts from fitting closely against the matrices. In an exaggerated form, this would appear like a capital "W" with the outsides of the letter representing the matrices and the inside representing two spacebands. The gap so produced permits the molten metal to adhere to the matrix side walls and will lead to their destruction.

Don't put a spaceband on either end of the line

The assembled line of matrices and spacebands is held between two parallel steel jaws in the casting position. Since these jaws are harder than the brass matrices, they are not affected by the friction of the mats. The spaceband, however, is tempered steel considerably harder than the vise jaws, and if in the process of justification, the band slides against either of the jaws, the resulting friction tends to destroy both the band and the jaw.

The following are the usual sizes of spacebands: Extra thin, usually used with the condensed faces, ranges from a minimum of 2 points to a maximum of 6½. The wide range band, also used for the same purpose, particularly in newspaper work, ranges from 2½ to 8½ points. Thick bands for normal spacing of ordinary sizes range from 2¾ points to 7¼ points. Special taper is the same as the thick or "regular" band, but half a point thicker throughout. Extra thick, used for law work and display faces, ranges from 3¼ to 10 points. A set consists of 30 bands, but 20 extra thick are sufficent for most display machines.

Both the Linotype and Intertype are so constructed that the machine should not cast unless the line is fully justified. Consequently, when the operator comes to the end of his assembled line of matrices, he must gauge the amount of space necessary to fill out the line, and then determine if there are sufficient bands in it to accomplish this purpose.

The thick or regular bands which are used for most work have a maximum expansion of 3 points when driven fully up. Therefore, if 36 points are necessary to fill the line, it will not cast unless there are at least 12 spacebands in it. If there are less than this number, the operator may run down thin spaces and insert one beside each band. Although it makes little difference on which side of the band the thin space is placed, there is less difficulty met when the thin space is placed on the right of the spaceband. If there are few bands in the line, and it obvious that two thin spaces beside each band will be necessary, use nut spaces instead. **Care must be taken not to reverse matrices when inserting them by hand, as a reversed matrix will not run through the machine.**

Do not gauge the amount of space in the assembling elevator by the distance between the assembler slide finger and the long finger of the line delivery carriage. On the linotypes by watching the movement of the assembler slide while it moves to the left, you will note the diminishing space between the screw end in the assembler slide clamp bracket, and the assembler slide bracket. This is used as a guage to show the space remaining in the assembling elevator for the line. On the intertype, the space needed to fill the line is judged by estimating the distance between the assembler slide sight piece and the tight line releasing lever. **Do not send through a line which is too loose to cast as it may cause a squirt.**

If the line is of such a nature that it is desirable to squeeze in an extra matrix rather than letter space or divide the last word, it is sometimes possible to take out some of of the spacebands and replace them with thin spaces between the words. If this is done, remember that some bands must be left in the line in order to make the machine cast. Examine any such line after the cast to make sure that the spacing is approximately even. Use the thin spaces between words which show more white space such as after marks of punctuation, or before a "w."

Do not send in a line that stops the star wheel

If too many matrices are put in the line, it will cause the star wheel to stop. When this happens, push in on the assembling driving belt shifter, which will relieve the pressure on the star wheel. Turn back the star wheel by pulling the lower part of the matrix delivery belt to the left. Open the assembling elevator gate with the left hand and remove as many matrices as necessary to let the star wheel revolve. Release the assembler slide brake which permits the slide to return to the right, pull out on the assembling driv-

ing belt shifter and be sure that the star wheel is moving. Sometimes it is possible to release the star wheel by opening the tight line release lever which permits the assembler slide to go another 6 points to the left. **Never use the tight line release lever to send a line to the cast as the last matrix may be sheared off at the toes.**

On very narrow measures, it is sometimes necessary to resort to letter spacing. Space matrices for this purpose are made in steel and brass, and come in ½, 1, 1½ and 2 point sizes. These hair spaces do not run in the machine, but drop off the line into a special quad box when the line is transferred to the second elevator.

Between sentences, the amount of space may be a spaceband, or a band and a nut space, or a band and a thin space, depending on office style. The spaceband alone is the most generally accepted style.

To quad out the end of a paragraph, strike the mut and nut quad keys with the first and second fingers of the right hand, dropping a spaceband after each pair until the line is filled.

To center a line, it is necessary to place an equal number of spacebands and spaces on each side of the characters to be centered. At the beginning of such a line, drop units consisting of a mut, nut and band. Reverse this at the end of the line, dropping a band, mut and nut. With practice, the operator becomes adept at estimating the amount of space necessary to center his line before it is set, thus by running down his spaces in the front of the characters which are to be centered, he does not find it necessary to transfer spaces from the end of the line by hand.

Safety: Do not send in tight or loose lines; they may cause a squirt. Avoid placing two spacebands together, or a spaceband on the end of a line. Let the assembly elevator drop of its own weight as soon as the line starts away. Be very careful not to place your fingers near the spaceband box when the line delivery is returning.

Assignment

In the APL cabinet will be found a box number corresponding to the number of the machine to which you have been assigned. In the box is a complete set of bands (25) for your machine. Count them, clean and put in your machine. Do not mix them with bands from other machines. At the end of the session return your bands to the proper box. Be sure you have as many as you started with. If there is any shortage, report it to an instructor.

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CASTING BORDERS

Border Matrices. Ornament matrices in many designs and sizes are made by both Linotype and Intertype for use either as single ornaments, or they may be combined to make decorative borders. Each section of such a design will join perfectly with the next to form a continuous border. It is also possible to cast such borders with other harmonious designs as corner pieces.

Matrices which are intended to be used as borders are made exactly like the standard matrix and if permitted to go through the machine, will run pi, unless the combination is specially cut to run in a magazine. Border matrices are usually but not always, one letter matrices: that is, there is but one character engraved on them.

In casting border matrices on the **Linotype,** place the matrices in the normal position in the assembling elevator, set the machine for the length and size of line to be cast and proceed to recast as explained in the previous lesson by setting the first elevator line stop and locking the spaceband transfer lever. When the matrices are made in even 6 or 12 point set, it will not be necessary to use any spacebands when casting borders on the Linotype. This is because the matrices, making exact justification, push the right hand vise jaw far enough to the right to open the pump stop safety lever and permit the plunger to descend for the cast.

On the **Intertype** machine a different procedure is necessary. Since the Intertype pump stop safety lever stays open only when the justification lever does not rise to its limit, provision must be made for operating the casting mechanism. This may be done by inserting a stop pin in the justification rod which will prevent it from coming up all the way. A more safe method, however, is to use spacebands on the left end of the line, to obtain justification. This is done by adjusting the left hand vise jaw and the assembler slide to one pica more than the length of line it is desired to cast. On the left end of the line, place first a thin space, then a spaceband, another thin

space and another spaceband, followed by the border matrices. This will be sufficient to cause a cast without danger of a squirt. This procedure may be also used on the linotype where it is desired to cast a line, such as 30 ems of leaders, or the matrices are not on an even-set body.

The Border Block. For casting a continuous border, a device known as the Matrix Slide Block is used. This block when viewed from the end has the same shape as a matrix but is made from 13 to 42 ems long, in one piece. On the casting side of the block a groove is cut to hold a matrix slide.

The matrix slide is a continuous brass mold made to fit into the groove in the border block. The design is cut the entire length of the slide in the case of rules, or centered on the slide in the case of dashes, braces and ornaments. Each end of the slide has a slit which spreads to prevent the slide from working out of the block. One corner of the slide is notched out and when the slide is inserted in the block, this notch fits against a small pin in the block to indicate the proper position of the slide. On the reverse or non-casting side of the slide, the face of the rule is indicated by name or number, together with the point size and special alignment, if any.

Ordinarily, the slide, like the matrix, is made to cast flush with the smooth side of the slug, or to be centered on a certain body. Consequently, if the slide is cast on a larger body than the face, the extra space or leading will be on the rib side.

The slide, like the matrices may be cast on a slug which is equal to or longer than the face, but should not be cast on a slug shorter than the face since the unsupported face will break off leaving a ragged edge. If a short slide is used on a long block it is necessary to fill out the block with matrix slide blanks, or a squirt will result.

In casting with a matrix slide block, it is customary to open the vise to insert the block in the first elevator jaws. Be sure to push in the control handle before unlocking the vise. Place the lower lug of the block **under** the first elevator jaw duplex rail, which corresponds to the normal position of the matrix. Push the block in until the right hand end just clears the first elevator matrix detents. Lock the vise, the spaceband transfer lever and the first elevator slide recasting block and make the cast.

Should the block or border matrices be accidentally placed in the auxiliary position no harm will result, as the line will cast blank. However, since the upward momentum given by the travel of the first elevator may cause the matrices or the block to jump fully or partially to the auxiliary position, it is a good practice to place the first elevator slide recasting block in operative position on both machines when casting borders.

If the machine stops at the casting position it may be because the block is not in proper position to go between the vise jaws. The left hand jaw may be in too far, or set to less than the measure of the block. In this event push in the control handle, raise the first elevator slide by backing up the cam and move the block to clear both jaws. Sometimes, also, the slide may not be properly inserted in the block.

Sometimes it is desired to use an ornamental corner piece in making up a border. The character used for this work may be cast on either or both ends of the slug by using matrices in the same line with a border block. Of course, the matrices and block together should not measure more than the longest slug the machine will cast. For example, if on a 30 pica machine, a 30 pica block plus a six point matrix is cast on one line, it would be necessary to put the matrix on the right side of the block and six points of the border slide face would overhang the body. This is occasionally done, the overhang being trimmed off on a saw. Border slides for this work are usually marked "special alignment." Since this type of border is joined by butting instead of mitering the slugs, it is necessary to cast them on a body which is the some size as the ornament to avoid a gap when they are made up. It should be noted however that the jaws of some models cannot be opened more than a fixed distance.

The Intertype block differs from the Linotype block in that it has a lug or projection below the body to prevent the spaceband justification lever from coming fully up. The Intertype block can therefore be used to cast without spacebands and may also be used on the Linotype. The Linotype block however, when used on an Intertype must be supplemented by spacebands or a justification lever stop pin, unless the Intertype machine is equipped with an automatic quadder. The slides made by each company will fit the other's block and may be interchanged for casting on both machines. Special blocks, however, are needed to cast matrix slides of 16 to 36 point size.

Borders should not be cast upon an advertising figure mold because the heavier rib makes the slug ejection considerably more difficult on the average machine.

In casting borders one of the worst possible shop practices is to place a screwdriver or wedge in the control handle and then walk away to leave the machine casting without attention.

Close inspection is necessary at all times when a large number of lines are being rapidly recast. The standard gearing for the typecasting machine is to deliver 6½ lines per minute. On a 12 point, 30 pica slug, the machine is using one and one-half

pounds of metal per minute. This metal must be replaced in the pot at a small but steady rate for the best results. If the pot is permitted to run low and then a large quantity of metal is dumped in, it will cause the temperature to drop too rapidly and the face of the slug may become quite shiny. This high polished condition is a sure indication of cold metal and is usually first observed on the face of the slug at the ends. A close inspection of such a slug will show that the metal has numerous depressions in it due to the solidification taking place before the metal had fully filled the mold. When this happens, there is nothing to do but wait for the metal to heat up. To continue casting will not help.

This chilled condition is particularly difficult in casting hairline rules and these must be watched very closely. If the condition is not due to dumping excessive metal in the pot, it may sometimes be overcome by temporarily turning up the mouth piece temperature control.

Safety: Be careful to put the border block in right side up. If this is not done, considerable damage will result. Be sure that the vise jaws are set to the correct measure. If they are set too wide, the machine either will not cast, or if it casts, a front squirt will result. Have an instructor check your machine before making the first cast with the border block.

Assignment

1. Cast six 30 pica leader lines on the Linotype using spacebands and matrices.

2. Cast six borders on the Linotype using a Linotype matrix slide block.

3. Cast six borders on the Linotype using an Intertype matrix slide block.

4. Repeat the above operations on an Intertype.

5. Cast six borders using an ornament matrix and the block together.

RECASTING

The regular position. If it is desired to recast a line in the regular position push in on the starting and stopping lever, assemble the line to be recast and send it in to the first elevator jaws. With the left hand, push the first elevator jaw line stop to the right until it touches the matrices on the left end of the line. Do not push the line stop in so far that the matrices on the right end of the line are pushed beyond the first elevator matrix detents. The line stop and detents prevent the end matrices from twisting sideways when the machine vibrates during the recasting process and are highly important since a twisted matrix in the casting position may result in a squirt.

Having adjusted the line stop, with the right hand pull the spaceband transfer lever to the right, at the same time use the thumb to push in on the spaceband lever pawl latch. The purpose of pulling the transfer lever to the right is to make positive that the spaceband lever pawl is securely locked by the latch.

Now the line is ready to be recast. Let the starting lever out into normal position and the machine will go around until the first elevator comes to the transfer position where it will automatically stop because the line has not transfered to the second elevator. At this position, pull the starting lever all the way out, and the machine will return to normal position. Continue to pull the starting lever out at these two posi-

tions until as many lines have been cast as are desired, but remember that the slug is not ejected until after the machine has passed the transfer position. Consequently if 9 lines have been recast and ejected, a 10th line is in the mold when the machine stops at the transfer position.

Clearing the machine. When a sufficient number of lines have been recast the machine must be cleared by passing the line to the second elevator bar as follows: When the machine stops at the transfer position, push in on the starting and stopping lever. Without rising from the chair, use the right hand to pull the spaceband transfer lever slightly to the right. With the left hand, pull the spaceband pawl lever latch forward, unlocking the machine. At this point the spaceband transfer lever is actuated by a strong spring and must not be allowed to fly across. Use the right hand to retard the lever and let it travel gently to the left until it will go no further. Now use the left hand to let the starting and stopping lever out to normal position which will cause the machine to come around to its normal position. When the student is more familiar with the machine it will not be necessary to use the starting lever at the transfer position as it may be left out in normal position, when the machine is being cleared. If this is done, pull the right hand quickly away as soon as the transfer lever has gone fully to the left, and the machine will start automatically.

With greater familiarity of the machine and its actions, an experienced operator does not wait for the machine to stop at the transfer position, as he unlocks the spaceband transfer lever while the machine is in motion, anytime before the first elevator has completed its upward stroke.

Assignment I

Recast a line in the regular position five times.

Using the "flap." If the matrices are to be recast in the auxiliary position, that is, bold face or italic, they may be assembled in the normal position in the assembling elevator, and raised to the auxiliary position at the casting point by using the first elevator filling-in piece. When this is used, the recasting process is the same as that described for recasting matrices in the regular position. When clearing the machine do not neglect to return the filling-in piece to the non-operative position.

If the machine is a linotype equipped with a double flap, use only one. If it is an intertype with a double stud on the slide, use only the H. L. (Head Letter) position.

Assignment II

Recast a line in the auxiliary position five times, using the first elevator filling piece. **Do not use the filling-in piece and assembling elevator duplex rails simultaneously.**

The auxiliary position. Whenever a line is assembled wholly or partially in the auxiliary position in the assembling elevator, a new factor is introduced in the recasting process.

Matrices which are assembled on the duplex rails of the assembling elevator, will be supported by their toes **over** the first elevator jaw duplex rail, while those in the regular position have their toes **under** the duplex rail. At the transfer position the first elevator jaw duplex rail is withdrawn and the matrices resting on it drop down to the regular position to permit their transfer to the second elevator bar. This means that a mixed line of matrices in the regular and auxiliary positions would drop to the regular position if we recast such a line. In order to prevent the matrices dropping to the regular position the ascent of the first elevator slide

is interfered with by interposing a block called the first elevator slide recasting block, usually referred to as the "italic recasting block." When the handle of this block is pushed toward the rear of the machine, the first elevator does not rise high enough for the first elevator jaw duplex rail to be withdrawn and the matrices will retain their relative positions in the first elevator jaws.

In clearing the machine, it is necessary to return the recasting block to the inoperative position as the line will not transfer (on an Intertype) or the matrices will spill when the transfer is made (on a Linotype). This block may be thrown clear any time before the first elevator jaws have come to the transfer position and the last line necessary has been recast.

If you have neglected to clear the recasting block and the machine stops at the transfer position, proceed as follows: 1. Push in on the starting and stopping lever. 2. Check the spaceband transfer lever and make sure it is locked. 3. With the left hand, push down on the first elevator slide to relieve the pressure on it and at the same time use the right hand to return the first elevator slide recasting block to inoperative position. The first elevator will now complete its upward rise and the machine may be cleared in the usual manner.

Safety: A front squirt can be caused by improper adjustment of the line stop, or by giving the mats a double raise in either of the ways described in this sheet.

Assignment III

1. Recast a line in the auxiliary position five times using the assembling elevator duplex rails.

2. Recast a mixed line of matrices in regular and auxiliary position five times.

3. Continue the balance of the session on straight matter, using this sheet for copy.

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MATRICES

The small brass plates from which the type-characters are cast are called matrices. The character is stamped on the inside edge of the matrix and is upside down. Matrices with one character stamped on the edge are called one-letter matrices; those with two characters, two-letter matrices.

Various parts of the matrices and their functions, commonly referred to are as follows:

Teeth—Projections on the inside of the triangular opening at the top of the matrix.

Bar Point Slot—This is a slot projecting downward from the bottom of the combination. The object is to make all matrices of the same thickness at this one point. The slot registers with the projecting blade on the distributor box bar to prevent the lifting of two matrices at one time into the distributing screws.

Regular Position—This denotes the character in the top or normal position of a two-letter matrix. Matrices from 4 to 24 point can be supplied with two characters. Above 24 point only one character can be used.

Auxiliary Position—This denotes the character in the auxiliary or bottom position. Characters on one-letter display matrices 16 to 60 point are also in the auxiliary position.

Lugs—These are sometimes called "ears." They are made to a certain thickness according to the magazine channel in which the matrix is to run. The lugs are the guiding points of the matrix throughout its travel. The lower lug (on the character side) determines the horizontal alignment of the character in the matrix, for this lug banks against the aligning groove in the mold body.

The lugs which fit into the proper magazine channels are not the same thicknesses on all matrices nor always as thick as the matrix itself. The lugs are cut to fit the channels regardless of the size of the characters; thus the lugs of all matrices for one channel whether small or large characters, are uniform. Were the lugs made as thick as the matrices regardless of size, a separate magazine would be required for each font of matrices.

Font slot—This is a small slot in the bottom of the matrix. In conjunction with the font distinguisher, it prevents wrong fonts from entering the magazine.

When the font distinguisher is properly set, the groove in the bottom of the matrix, called the font distinguisher slot, straddles a thin projection in the distributor box and prevents the mixing of different fonts of matrices in the magazine. If set for 10 point, an 8 point matrix will not enter the distributor; also if a matrix is reversed when going to the distributor, its font slot will not align with the font distinguisher and the matrix will be stopped before reaching the ditributor bar.

Bridge Notch—A slightly larger opening than the font slot. It is used in conjunction with the matrix bridge on multiple distributor machines to permit the matrix to distribute to its proper magazine.

Clearance Cut—This is a feature of matrices which protects the side walls of matrices as they assemble.

Number—The number indicates the point size of the matrix and the name of the matrix face. The entire marking should always be given when ordering matrices.

Sidewall—The letter or character is stamped on one edge of the matrix, leaving two walls on either side which are very thin. Should these walls become crushed or damaged in any way, metal flows between the small molds and shows, in print, what are called hairlines.

Reference Markings—These are characters punched in the front side of the matrix to enable the operator to read the line of matrices as they are assembled.

Face Lines—These are lines cut in the bottom of two-letter matrices (and on the reference side of display matrices) to identify the font. When matrices of a two-letter font are stacked in a sorts tray, the various lines match up and tell at a glance whether a wrong font matrix is present. With display faces, wrong font matrices can be detected in the sorts tray or the assembling elevator, since the face lines are on the reference side of the matrix.

Lightening Grooves—As the name implies, these grooves are cut in large matrices to lighten them. On extra large matrices a lightening hole is used instead of a slot.

Bevel Cut—An angle cut used on larger matrices to permit proper distribution.

Matrix distribution is achieved through the use of matrix tooth combinations, each character running in the magazine having its own particular combination. The term "tooth combination" refers to the teeth on the inside of the triangular opening at the top of the matrix. There are seven of these teeth on each side, and for convenience in referring to them, they are numbered from 1 at the top to No. 7 at the bottom. The

teeth on both sides are numbered alike, and in cutting combinations, both of like number would be cut out or left in, as the case might be.

In conjunction with the tooth combinations there is a distributor bar, along which the matrices are carried by revolving screw action. When the combination of a given matrix arrives at and meshes with its complementary distributor bar segment, the matrix is released from the bar and falls by gravity into its respective magazine channel.

A matrix with all its teeth is called a "pi" matrix. It does not drop in any of the magazine channels, but is carried across the full length of the bar, and drops into a tube, through which it falls, by gravity, to the sorts stacker.

The primary function of the matrix teeth is, then, to direct the return of the matrix to the magazine channel assigned to it. A secondary function of the teeth is to provide the means for elevating the matrix to the distributing mechanism and guiding it on to the distributor bar.

In order to cause matrices to drop into their respective channels, certain of the combination teeth must be removed. This is called "cutting the combination." By cutting away some of the teeth and leaving others in the matrix, it is possible to secure 126 different tooth combinations for controlling the distribution of a like number of different matrix characters to the channels of the main and auxiliary magazines. The standard magazine contains 91 channels, including an extra channel for lower case "e," and the wide auxiliary magazine 34 channels, to each of which is assigned a different combination on the distributor bar.

To enable the matrix to travel from one position or transfer point to another with a maximum of smoothness and with a minimum of friction and resultant wear, the teeth must be perfectly proportioned with relation to the functons they are designed to perform. The teeth of the matrix, the teeth of the second elevator and distributor box bars, and the segments of the distributor bar are necessarily interdependent and inseparable in the distributing mechanism.

The matrix combination is sufficient under ordinary conditions to last for years. It is possible, however, to ruin a set of matrices in a very short time by burring or wearing out the combinations. The cause of the combinations becoming injured is invariably due to bad alignment at one or possibly all of the various transfers.

There are three of these transfers; that is to say, the matrices are transferred at three distinct points where the teeth are involved.

The first transfer is from the first elevator jaw to the second elevator bar at the intermediate channel. A matrix, when in position in the first elevator jaw at this transfer point, should line up with the bar so that you will have a perfect transfer onto the bar, without binding. There is a set screw at the bottom of the first elevator slide, on the right hand side, for raising or lowering the slide. The alignment of the first elevator jaw rails and the intermediate channel rails should be perfect. This will take care of the vertical alignment. Then, to take care of lateral alignment at the point where the matrix is supported by the first elevator jaw rails and is just sliding on to the second elevator bar, there is an intermediate channel front plate extension which, by means of screw bushings, makes it possible to move the second elevator bar either toward the front or the rear, as may be desirable to secure a true aligning condition of matrix teeth and bar. This is one of the most important adjustments from the standpoint of the matrix teeth. The second elevator bar should, of course, be perfectly smooth and free from burrs, as should be the other two bars along which the matrix must travel.

The second transfer is from the second elevator bar to the distributor box bar. The second elevator, when in its normal position, should be so adjusted that the second elevator bar will line up with the distributor box bar. This is a doweled factory setting and ordinarily should give no concern.

The third transfer is from the second elevator bar rails to the distributor bar. These rails should be perfectly square with one another. Place a matrix on the distributor box rails and raise up the outside distributor screw; turn the distributor screws slowly by hand and see that the matrix when supported on the distributor box rails will transfer freely on to the distributor bar. This adjustment is likewise factory-set. It does not shift under ordinary working conditions.

Matrices should be handled with care and not allowed to lie on the floor nor on the machine where they will be in danger of being damaged or lost.

Before any matrices, either sorts or matrices picked up from the floor, are run in the machine, their markings should be compared to see that they are of the same face. The marks on the spaces and leaders sometimes vary from those of the rest of the matrices in the font, and may cause confusion.

Never handle the matrices with dirty or greasy hands, nor allow oil to accumulate in the passageway of the matrices in the machine. Dirty, bent or greasy matrices cannot be expected to work properly in the machine.

THE AUXILIARY POSITION

In the smaller sizes, up to and including 14-point, nearly all matrix faces are punched on two-letter matrices; that is, every font of matrices carries a combination of two characters. These combinations are carefully planned to bring together the faces that are most likely to be used together. Many fonts contain a roman face with small capitals and light face italic. Others provide a roman face with an appropriate boldface or a bold face with a bold face italic. There are also a number of special combinations available which have been devised to meet specific requirements of newspaper, directory, legal, and other specialized branches of the industry. The italic or bold face character is usually cut in the lower position. Therefore when it is desired to set matter in italics or bold face, the matrices are cast in the auxiliary position. The bold face or italic may be obtained by the simple operation of pushing in both duplex rails of the assembling elevator. This causes the matrices to assemble at a higher position, thus bringing the lower characters to the casting point. The matrices may be thus assembled in raised or lowered positions in the same line.

The em space when raised makes an em leader. The em leader, when raised, makes an em space. If the type being composed is bold face, the en space when raised makes an en leader. The en leader when raised makes an en space. If the type being composed is italic, the en leader when raised makes a small capital. If an en space is needed in an italic font, use two thin spaces instead.

When a raised line is to be spaced by hand, the regular em and en spaces cannot be used unless they are lowered. This may be done by assembling the whole line in the raised position, opening the gate, tilting the top of the spaces forward, and pushing them back. They will then drop to the lower rail and cast as spaces. If raised, they will become leaders. Another way, is to use thin spaces since they have no character and may be used in either the raised or lowered position.

If a large amount of matter is to be set in the auxiliary position, it is advisable to use the first elevator filling-in piece

rather than the duplex rails. This is because there is a tendency for matrices to jump out of the assembling elevator when the duplex rails are in and the operator is setting swiftly.

The first elevator filling-in piece is a piece of metal usually referred to as the "flap" which may be interposed between the first elevator banking screw and the vise cap in order to prevent the first elevator from making a complete descent. The thickness of the filling-in piece is exactly the size of the difference between the bottom and top aligning grooves of the U. A. mold. The toes of the matrices, which would normally engage in the bottom mold aligning groove or normal position, are engaged in the top aligning groove of the mold or auxiliary position when the filling-in piece is used, although the matrices are in normal position in the first elevator jaws.

Be sure that you do not raise matrices to the auxiliary position in the assembling elevator and then also use the first elevator filling-in piece. To do so means that the line will be in auxiliary position in the first elevator jaws and when presented to the mold at casting position, the toes will be raised too high to enter the aligning grooves of the mold, and will enter the mold aperture or be sheared off. In either case some damage is caused, and a squirt may result.

Both the linotype and the intertype are equipped with safety devices to prevent this occurrence, but these safeties like all others, are rendered useless if force is used. **Never use force on a typecasting machine!**

Assignment No. 1

Using the first elevator filling-in piece, set the following copy in bold face or italic:

> After the operator becomes thoroughly acquainted with his machine, accustomed to the sounds that distinguish the many working parts, and is able to concentrate his mind on the copy before him and at the same time watch the matrices in the assembler, the operation of the keyboard becomes mechanical and no effort is required to keep track of the type and copy.
>
> The student must learn to analyze the copy, follow a uniform style througout the job, and produce sound usable lines. Care must be exercised after the lines are set, that they are not battered by careless handling on the part of the operator. Nothing should ever be laid upon type after it has been placed upon the galley.
>
> Start slowly; develop accuracy now or never; learning correctly now will be much easier than unlearning

later. The accurate operator is he who sets a clean proof; only errorless type is printable. Speed cannot be forced, it cannot even be urged, but comes naturally with hard, persistent, and constant practice. The operator who masters the keyboard, and attains a journeyman standard of speed under one year is very fortunate indeed.

There are many other things to look after, besides the operation of the keyboard. Since no machine runs perfectly all the time, it remains for the operator to keep a close watch and an open ear to detect trouble the instant it starts. He should occasionally glance at the stick to see that the slugs are coming out properly. Frequent examination of the slugs keeps the operator on the lookout for hot or cold metal. The metal pot must be kept in mind and after a certain number of slugs are set, as determined by the size of the slug, fresh metal is fed into the pot.

Getting the ear accustomed to the different sounds enables the operator to detect when a letter fails to respond, when more than one matrix drops, when the spacebands hang up, when the assembler chute clogs, or when a line is overset. The distinctive sound when the slug casts informs the operator that the line is being delivered, but failing to hear it, he knows the line was too short and must be reset. Intuition almost invariably tells the operator when the distributor has stopped. All working parts are easily distinguished by their separate peculiar sounds and the operator should constantly be on the alert to detect trouble before it becomes serious.

Assignment No. 2

Replace the filling-in piece to normal position and set the following in bold face or italic, using the assembling elevator duplex rails.

In setting straight composition it is necessary for the operator to read ahead and to carry the sense of the article in his mind. The machine operator's fingers seek the keys mechanically and his eyes remain on the copy, reading letter for letter or word for word as the keys are operated. After the line is raised, the operator may let his eyes travel ahead, in order to get the sense of the article to note whether punctuation and spelling are correct. The capable

operator does not follow copy blindly, but corrects obvious errors whenever he finds them.

If an insert is to be made in the type and the copy for the insert is further along in the manuscript, place a catch line in the job like the following to indicate where it is to go:

———— INSERT "A" ————

When you come to the copy for the insert, put a similar catch line over it:

———— INSERT AT "A" ————

At the end of the copy for the insert put in a turned slug or a line beginning with a few dashes to clearly indicate the end of the insert and the beginning of the regular copy.

This will enable the bankman or make-up to immediately catch and place any work necessary before the galleys are read. As machine composition is usually charged at two to three times the cost of hand composition, the time saved by the operator lessens the cost of the job to a greater extent than the same amount of time saved by other workers.

If in making corrections it is necessary to over-run a line or more, the extent of the over-run should be indicated by marking the proof with a bracket at the side of all the lines reset.

At the end of the session, pull a proof of your work and submit it to the desk. Be sure your proof contains your name slug, machine number, and date.

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CASTING HIGH AND LOW BLANK SLUGS

It is a customary practice for operators to keep on their machines a number of various sized dashes which have been pre-cast to be inserted so as to indicate the end of an article or a take.

In some shops, it is a practice to place blank slugs the size of the body matter being set, to indicate a head to come or to otherwise space out the job on hand. If the operator has not noticed in advance that a number of these blanks are needed, he will usually send through a line of em spaces and bands to cast a blank at the proper point. If the job shows that a number of such lines will be needed for spacing material, this blank line may be recast and the slugs put aside for insertion by hand when necessary.

When this procedure is followed, do not interrupt setting to insert the blanks. Keep them adjacent to the left hand and make the insert as you send up the assembling elevator with the line which is to follow the blank.

On the **Intertype** a blank line may be cast by pushing the left hand vise jaw up against the right hand vise jaw. When this is done, the blank line justification wedge rises to engage against the left hand vise jaw bracket. This holds the jaws together and prevents the justification lever from coming all the way up and holds open the pump stop lever to permit the cast to be made.

To cast a blank line on the **Linotype** it is necessary to move the right hand vise jaw to open the pump stop. This may be done in several ways. As previously explained, a line of quads and spacebands may be sent in. Some, but not all Linotypes are equipped with a detent which will hold the left hand vise jaw against the right jaw tightly enough to cause a cast. To see if a machine is so equipped, bring the left hand jaw fully to the right. Now push it to the left again. If the jaw moves easily to the left, there is no special provision for casting a blank on this machine. If, however, there is a distinct effort needed to separate the jaws, after which the left hand jaw moves freely, the machine is equipped to cast blanks in a manner somewhat similar to the Intertype.

Another way to cast a blank on the Linotype is to bring the left hand vise jaw indicator scale to 0 picas and lock it there. This will exert sufficient pressure on the right hand jaw to open the pump stop.

When a blank has been cast by pulling over the left jaw only, it is not necessary to replace the jaw before sending in the next line as the delivery slide long finger will push the jaw back into position. It is of course necessary to reset the left hand jaw if the original setting has been changed by bringing it to 0 picas.

Old time operators would often cast a blank on the Linotype by bringing over the left hand vise jaw and holding it by hand while the cast took place. This is an extremely dangerous procedure for the novice and should never be attempted.

Under no circumstances should the operator attempt to cast a blank slug by holding open the linotype pump stop lever. This may result in a very bad squirt and burning of the hand which is holding the lever.

On **either** Linotype or Intertypes equipped with automatic quadders, it is only necessary to pull the starting lever to get a blank line. Either or both jaws will move depending on the setting of the control lever to automatically cast a blank slug.

The standard mold is .875 inches in height of slug. This plus .043 inches depth of cut in the matrices makes .918 inches of height to paper. A blank slug cast on a regular mold is therefore .875 inches high.

There is a tendency for these high blank slugs to show up on the press, particularly when a number of them are used together. To offset this, and to provide for various spacing material, both Linotype and Intertype make special low slug molds for casting up space material.

The low slug molds are made to cast a slug which is the same height as foundry leads and slugs, that is .750 inches.

Unlike the usual machine mold, the cap and the body of the low slug mold are parallel to each other and have no taper to the back. Also they do not have ribs and consequently the slug is smooth on both sides. These molds will cast ribless, low slugs from 5 to 14 point inclusive and can be used on any model of the manufacturer's machine. The liners however are special right and left hand which are not interchangeable with ordinary liners, and when placed in the mold, they appear to project beyond the face.

In using the low slug mold it is necessary to use a regular matrix slide block with a special slide. The slide is easily distinguished by the fact that no character is engraved on its

face, it is larger than the regular slide, has no slits at the ends and is about two picas longer than the regular slide. In addition it is nearly twice as thick. This extra thickness is designed to make up the difference between the height of the low mold and the regular mold.

To cast low slugs, set the machine as for recasting border slides, but use the low slug mold and the thick slide in the matrix slide block.

When the machine advances to the casting position, the projecting special slide will fit in between the projecting special liners and make a tight lock-up.

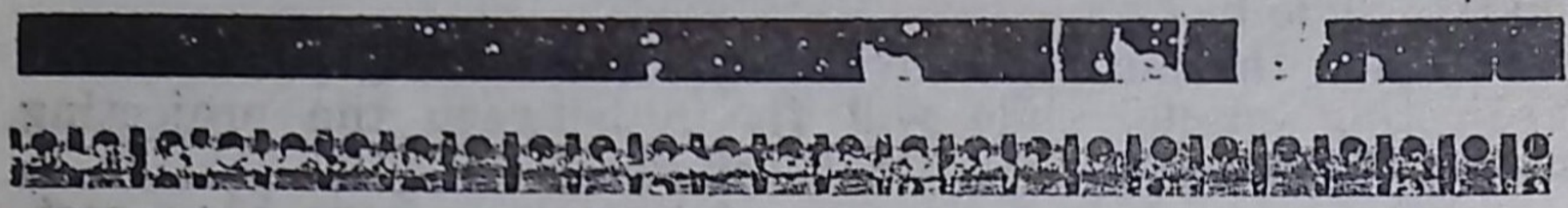
When a sufficient number of low slugs have been cast, return the machine to normal operation by clearing it. **Be sure to change over to a regular mold.** If a regular border slide or a line of matrices is sent to cast on a low slug mold, there will be a gap of .125 inches (.875 inches regular mold minus .750 inches low mold) between the face of the matrices or slide and the low mold. The machine will cast in the ordinary way but because there is not a tight lock-up, the escaping metal will cause an unusually bad front squirt.

A condition frequently encountered in recasting is to get a bad foot on the slug. Every few inches, turn a slug upside down. If it shows solid at the edges, and hollow in the center, this is because the metal is not able to solidify quickly enough.

At a normal rate of casting, heat is dissipated by the mold rather quickly, but in recasting the mold holds so much heat that only the metal which comes in direct contact with the mold is solidified and the inside of this chilled shell, still in molten condition, drains back into the pot after the cast has been made. If such a slug is weighed in the hand it will be distinctly light as compared to a similar sized solid slug. If it is broken in half, it will break easily, and the inside will be observed to be porous and full of large air bubbles. When such a slug is locked up, the body will squeeze in, making a tendency to work up on the press. Air bubbles under the face will cause the face to drop under the pressure of the cylinder or platen and cannot be brought up by patching. This condition may be overcome by either temporarily turning down the heat of the metal or by using two molds instead of one and casting on alternate molds for one minute each. If only a few slugs remain to be cast, it is also possible to push in the control lever just after the pot plunger begins to descend. If you count from one to ten as rapidly as possible, this will delay the upstroke of the plunger

just enough to give a good foot to the slug. This should not be done too long or too often as the excess heat of the mouthpiece, communicated directly to the mold may warp the disk.

The foot of the slug will also tell of the condition of the mold and mouthpiece. These impressions of the back of two slugs tell a significant story. The top one clearly indicates the mouthpiece vents and holes, cleanly cut off by the back knife.



The second shows an accumulation has built up between the mold and the mouthpiece to such an extent that they no longer lock closely together and the back knife is cutting a solid piece of metal. This condition unless quickly cleaned up will cause a back squirt. In addition such a slug will be more than type high and cause considerable trouble in the pressroom.

In casting large faces of type such as 36 point, the operator may encounter both hot and cold metal simultaneously. This is because the larger brass matrices pull the heat from the metal so quickly that the face is imperfect. It is advisable to hold such a display line for a recast. If the face is not perfect, on the first slug, the matrices will have been heated up to such an extent that the next cast will usually be satisfactory. The heat in the mold, however, as previously explained, may prevent the slug from becoming solid. To overcome the latter condition, briefly stop the machine at the casting point as previously explained.

Remember that in all casting, the smaller slug needs more heat and larger slugs need comparatively less heat for best results.

Assignment

1. Cast six high blank slugs on an Intertype, using matrices and spacebands.
2. Cast six high blank slugs on an Intertype, by using the left hand vise jaw only.
3. Cast six high blank slugs on a Linotype which has a self locking left hand vise jaw.
4. Cast six high blank slugs on a Linotype, using matrices and spacebands.
5. Cast six high blank slugs on a Linotype by locking the left hand vise jaw indicator at 0 picas.
6. Using a low slug mold, change the liners and cast ten low slugs. When you are finished, clear the machine and replace it to its original settings.

RUN AROUNDS

Where illustrations appear on a page with accompanying text matter which is set along the side of the illustration, the setting of the text is referred to as a "run-around." The generally accepted amount of white space between the illustration and the text is usually one pica. This space, called the tacking edge of the cut, is utilized to fasten the plate to the base.

When a run-around is to be set, the copy may be marked for the operator, showing how many lines and what length they are to be set, or the operator may be given a dummy make-up sheet showing the position of the cut from which he determines the necessary run-around for himself.

When the illustration appears in a corner of the page, it may be so placed as to bleed off, but the more common practice is to line the outside edges of the printing surface of the cut with the outside alignment of the accompanying text. In order to obtain the width of the line he is to set, the operator measures the distance from the inside edge of the illustration to the outside edge of the column, or the page, as the case may be. From this, at least one pica is deducted for margin, leaving the measure to be set. If the cut is placed inside the page with type on both sides, it is necessary to deduct at least two picas for margin and divide the remainder in half when the cut is centered

To find the number of lines in depth for the indented measure, convert the depth of the illustration to points. Divide this number of points by the point size of the slug. Be careful to use the slug size and not the face size, since the face may be on a leaded body. To the number of lines depth which was found, must be added enough additional lines to provide for suitable margin over or under the cut. If a caption appears under the cut, this must also be taken into consideration in determining the number of lines of depth to be set.

As a compromise between appearance and economy, it is customary in book, catalogue and newspaper work to place the same amount of margin all around the illustration. In advertising agencies and periodical work, the margins may

vary greatly from the above, depending on the desirable appearance to be achieved or on office style. Such variations should be indicated by the dummy.

In setting run-arounds, extreme care must be taken that no "outs" occur. The operator must be careful to see that every line casts, especially in setting short measures with few space bands. Since the run-around lines are measured on the machine galley, an out or a line which did not cast will throw off the entire count all around a centered cut. This almost invariably occurs at the beginning of the job which necessitates resetting the entire copy. If the operator is in doubt as to whether or not the line will cast, he may look through the face plate of the machine to observe if the plunger descends. When more experience has been obtained in operating he will learn to subsconsciously listen for the distinct sound made by the machine when it casts.

When the operator is given an irregularly shaped cut to run-around, a dummy sheet for the make-up should be furnished, showing the position of the cut and the caption, if any. The job can be set by measuring from the edge of the page or column to the face of the cut, allowing for proper margin, and adjusting the left hand vise jaw and assembler slide to take the maximum length of line the measurement indicates. Another way is to leave the left hand jaw and assembler slide at the full measure and drop em, en and thin spaces on the end of the line to obtain the required amount of indention. This indention may be found by drawing a line through the illustration on the dummy which will indicate the full width of the type, if there were no cut. Quads may be lifted from the assembling elevator and placed on the dummy, filling out the line to the edge of the cut. The quads are now replaced in the assembling elevator, and as many words set up as may be necessary to fill out the balance of the line.

In the case of a recurrent publication or a large publication which has a number of irregular shaped cuts to run-around, it becomes worth while to set up a dummy page like the accompanying. This is set by recasting a line of mats of the face used on publication, on the same sized body as the job regularly takes. These lines are then made up into the regular page size of the publication and used for make-up and lay-out dummies. Notice that the lines both work out from the center of the page, running from 1 to 0, then repeating. The line is cast by opening the vise jaw and assembler slide one em beyond the size of the line and placing the spacing necessary for justification at the left side of the line which must be completely filled by the characters.

8.	7.	6.	5.	4.	3.	2.	1.	0.	9.	8.	7.	6.	5.	4.	3.	2.	1.

On this dummy layout page, the cut is placed face up, and a line drawn about the outside. The same thing may be done with a proof of the illustration, but space for margin must be allowed in tracing the outline. If any captions are to appear, they must be allowed for.

The outline drawn on the dummy will now show how many lines are affected by the run-around. Counting out from the center, it also shows how many spaces to drop on the end or beginning of each line in order to obtain the necessary blank space.

For example, if the penciled outline crosses between the first downstroke from the inside and the period next to it, a one em quad will be indicated; between the period and the figure would be a quad and a thin; through the figure would be a quad and a nut; between the figure and next downstroke, an em, en, and thin space.

Remember that this type of a layout page is only economical if the size and complexity of the job warrants it. This page cannot be used for any other job unless the type has the same set and is cast on the same sized body. When such a layout page is cast for a font in which the period and downstroke is not in a 4 to the em body, it would be necessary to start with a leader from the inside, and use one leader in place of a period and downstroke, thus: .1.2.3.4 etc. This also should be the style if there are not enough periods and strokes in the font to fill the line when using the former method. Always cast the right hand column first, the left will be the identical line, but reversed.

Assignment

1. Cast three inches of a right and left hand column for a layout page.

Show the first line to the instructor before proceeding with the job.

2. Pull a proof of these columns with one pica column space.
3. Draw an irregular design on the proof you have just taken.
4. Set any copy to run around the design you have drawn.
5. Submit your design proof and a proof of your run-around to match it to the desk.

School for Machine Typesetting

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J. HENRY HOLLOWAY, *Principal* THOMAS J. O'CONNELL, *Instructor*

POWER SAWS

The use of power saws is given in this course of lessons only in so far as they are concerned with cutting machine slugs and rules. While the lesson is based on the Miller Saw-Trimmer, which seems to be the most generally used in composing rooms, the basic mechanical principles of all such power saws are generally the same, and with only a slight difference, may be applied to all types.

The Miller Saw Trimmer saws and trims in one operation, gauging to the American Point System. The combination of a saw blade and a trimmer head in one, so that they act simultaneously, is the basic principle of the machine. The saw and trimmer are mounted on the same mandrel, with the trimmer knives projecting through the saw blade.

The micrometer gauge is adjustable to points and fractions of points by simply turning the knurled worm. The right-hand graduations on the worm gauges lengths; the left-hand graduations, used in conjunction with batter, gauges miters. To change the adjustment quickly, the gauge may be lifted free from the rack and moved forward or backward.

The Standard equipment furnished with the Miller Universal and Heavy-Duty Saw-Trimmers consists of the following: 1 column complete with tables, elevating mechanism, saw arbor and single pulley idler; 1 swivel gauge with locking bolt, nut and locating pin; 1 point end gauge with 40-pica finger (Heavy-Duty, 1 extra point end gauge with 60-pica finger); 1 saw hood with bolt and nut; 1 front and 1 rear metal chip box.

The sliding table is equipped with a pica swivel gauge, and a micrometer point end gauge, by which dimensions up to 60 picas may be secured on the Universal, 134 picas on the Heavy-Duty, in picas, points and fractions of a point. These gauges are quick-acting and are guaranteed absolutely accurate with the American Point System.

The table slides freely and provision is made for wear, to insure accuracy. The main tables of the Universal and Heavy Duty Saw-Trimmers are equipped with an elevating mechanism whereby the tables are raised and lowered in relation to the

saw-head. The Special-Purpose and Bench Saw-Trimmers are not equipped with the table elevating mechanism. This elevating mechanism is controlled by a micrometer point dial marked by points and half points up to two picas for one revolution. By the operation of these gauges any vertical or lateral cutting required may be made with absolute accuracy to the American Point System. When tables are elevated, the hinged table automatically folds into place, forming a plain saw table. To adjust the elevating gauge when a new blade has been placed on the machine, an old slug or reglet is laid flat along the center line of the hinged table which indicates the highest point of the blade. With the table well above the saw, lower it slowly, while pulling the belt by hand. When the revolving blade just touches the slug, unlock the elevation gauge set screw, revolve the gauge plate until the zero mark is under the pointer, and relock the set screw.

The metal cutting blade of printer's saws differs somewhat in principle from ordinary saw blades. The blade of the printers' saw is designed to give a smooth, even cut. In order to do this, the teeth are not staggered right and left as in wood cutting saws, but are all in the same plane as the saw body.

If the teeth were the same thickness as the body, there would be a tendency for the material which is being cut to bind on the body. In order to overcome this tendency, the saw teeth are swaged. That is, in the process of sharpening the saw, a piece of square stock with a "V" shaped cut in one end is placed over each saw tooth and given a smart tap. This has the effect of broadening the apex of the tooth and making it wider than the base. Without this swage, no matter how sharp the teeth may be, the saw will bind when material is being cut. After swaging, each tooth of the blade is filed to a uniform distance from the center of the blade.

The blade is fastened to the head by three screws. The head in turn, is screwed on the arbor with a **left hand** thread. To remove the head from the arbor, rotate the table elevating lever counter-clockwise until the table is all the way down. Push the sliding table back until it clears the blade. Raise the hinged table all the way back. With the left hand, pull the leather driving belt down while pushing up on the arbor locking pin with the right hand. When the pin engages, grasp the head with the right hand and turn it to the front. Be very careful not to grasp the blade with the bare hand as a serious cut may result.

When a new blade has been placed on the head, it is necessary to re-adjust the gauge to the blade and trimmers as follows: Turn the head as tightly as it will go on the arbor.

With the right hand, revolve the belt so that the blade moves forward as in cutting. At the same time the left hand slowly turns the worm screw on the end gauge until the revolving blade just touches the gauge finger. At this point it is locked. Now the screw which holds the right-hand point and gauge indicator is loosened and the indicator revolved until the "11" mark concides with the indicator notch. At this position, the screw is re-tightened. This means that we have adjusted the new blade to cut to even picas when the gauge indicates 11 points. (A piece of steel furniture may also be used for this purpose.) In some shops it is the practice to set the saw blade to cut even picas when the gauge shows 11½ points.

The saw blade when cutting metal, has a tendency to leave a rough edge and in the case of strip or slug material, to leave a burr on the end of the cut. For this reason, trimming knives are used. The trimmers make a smooth even cut and remove the burrs caused by the blade. To adjust the trimmers, loosen the locking screws in the head a quarter turn; revolve the head until one trimmer is on top; lower the table until it is just below the bottom of the exposed trimmer. Now turn the worm until the end gauge, almost touching the blade, coincides with the indicator notch at zero. At this point, lock the gauge. Now give the trimming knife a very light tap, driving it against the gauge. Lock the trimming knife set screw and repeat this operation on the other two trimmers. The saw is now set to cut even picas at 11 or 11½ points (depending on shop practice) on the blade and at zero on the trimmers. This gives the trimmers a maximum cut of one point and promotes longer wear than when the adjustment is made for a heavier cut.

The most important things in the use of the saw are first: your safety, and next the safety of the work and the equipment. Since the teeth are bound to throw out chips which endanger the eyes, a saw guard is hinged to the back of the table. This guard should always be left over the blade when the saw is in operation. It automatically raises and lowers when the table elevating mechanism is operated, and fully covers the blade at all times. In addition, the New York State Labor Laws require that a pair of shatterproof goggles be placed conviently near each saw as a further safeguard to the eyes. While some shops evade this law, you must obey it when using the saws in the school. These glasses are sterilized after each use.

To safeguard your fingers a workholder is attached to the sliding table. This is operated by lifting the handle up and bringing the finger forward against the work. The handle is now dropped down and revolved clockwise to tighten it against the work being held. It is released by reversing this procedure.

To take the workholder off the table, release the locking screw at the rear a few turns, raise the table to clear the saw blade and turn the workholder a quarter of a revolution clockwise, when it can be lifted from its socket.

When cutting leads and slugs (do not attempt to cut more than 1½ inches of material at a time) there is a tendency for them to bind on each other and not go fully up to the gauge. To facilitate bringing the material fully up to the gauge a "T" shaped piece of steel known as the batter is used. Sliding in a groove in the table, the head of the batter is always parallel with the end gauge and should be pushed lightly against the material before the work holder is tightened down.

If the workholder is tightened too much in cutting strip material or slugs, there is a tendency for the work to spring on the left side. On the other hand if it is not tightened enough, the work may jump out when passing the trimmers. Because they lack the judgment of experience in this matter, many saw operators hold the left side of the work with their fingers. This is not a practice to be recommended. The safest place for the hands is as far from the blade as possible. When pushing the table forward, put your left hand on the swivel gauge a few inches from the left end. Put your right hand to the left of your left hand. By crossing the hands in this fashion there is less danger of accidentally coming in contact with the saw blade.

SAFETY

Play safe in using the saw.

Do not operate the saw except in the immediate presence of your shop teacher.

Do not permit any distraction when the saw is running.

Use the goggles.

Use the saw guard.

Use the workholder and not your hands for holding material.

Keep your hands crossed when pushing the table forward.

RUNNING HEADS AND FOLIOS

When the same heading appears at the top of each chapter or page of a book, or magazine, it is called a running head. These headings may or may not carry the folio on the same line.

To cast a running head, we set the machine for recasting as previously explained, by locking the spaceband transfer lever, setting the line stop, and using the first elevator slide recasting block.

Although the running heads may be set flush right or left on the slug, the more usual style is to center them. If the heading is letter spaced, it is preferable to use space matrices rather than spacebands in order to get the effect of even spacing between the letters. Space matrices should also be placed between words in preference to bands since the mechanical process of justification may not always drive the bands up the same distance, even on a recast line. An equal amount of spaces and bands are placed on the ends of the line to center it, but it is always advisable to test the centering by placing two slugs back to back. If they do not line exactly, it shows an inequality in spacing. When backing the slugs for this purpose, place the smooth sides together, since if they are backed with the rib sides together, the ribs may catch on each other and cause an error in the lineup.

Running heads cast as above are sometimes combined with one or more slugs to make up a wide heading. Also such heads may be placed on a job and the folios are later cut in.

In setting folios which are to be cut in on a running head, the liner should be set to the shortest measure

which will give two ribs on the finished folio slug. If the cut-in slug has only one rib, there is a tendency to wobble when locked up, causing workups and slurs on the press. Even numbered folios should be set at the beginning of the line and odd numbered folios at the end of the line. Two cut-in folios are often set on opposite ends of the same slug, and cut apart as:

2 | | 3
4 | | 5

If the folio and running head are to be set on one slug, recast a pair of lines without any folios to check for centering. With the machine in normal position, pull out the control lever to start it, and quickly push it in again. This will cause the first elevator jaws to stop mid-way between the line delivery channel and vise jaws. With the control lever all the way in, use the first and second fingers of the right hand to reach in between the elevator jaws and take out sufficient space matrices on the right end to match the number of matrices in the folio which is to go in. Now insert the folio matrices in the same manner. Be sure that the folio you insert is in the proper position with relation to the first elevator duplex rail. Proceed in this manner until all the odd numbered folios have been cast. This manipulation will be found difficult at first, but once the knack is acquired, it is much faster than opening the vise to change matrices. If a large number of folios are to be cast, it is sometimes advisable to remove the line delivery channel to facilitate the changing.

On an old, well worn machine, there may be some difficulty encountered in stopping the first-elevator on its way down to the casting position. If this is the case, the folios may be changed immediately after the cast, when the first elevator is on its way up, when it is easier to control its movement.

When all the odd folios have been cast, replace the space matrices which have been taken from the right end of the line. Remove the line stop. Using a twisting

motion, change the matrices on the left of the line to cast the even folios.

If the folios are to appear without a heading, they may be set at the extreme ends of the slug. For this type, set the assembler slide and left hand vise jaw to 4 picas and set up all the odd folios. If the measure is short, the even folios may be set full length, but if the measure is so long that there are insufficient matrices to quad out rapidly, the even folios may be changed by hand in the first elevator as previously described.

When folios are to be centered on a line, if the measure is short, set each line, in the usual fashion for centering. However, if the measure is long, the left hand vise jaw may be pulled in to blank out a part of the line. The distance which the left hand jaw is pulled in depends upon the amount of space occupied by the longest of the folios to be set.

Assume that we are to center folios on a 30 pica measure. If they run no more than two figures in 12 point there will be 14½ picas of blank space on each side of the longest folio. (30-1=29, 29÷2=14½). Add to the amount of blank space, the length in even picas occupied by the folio (14½+1) and set the assembler slide and left hand vise jaw for that measure. (15½ picas). The folios are now set at the beginning of the line and quadded out. In the case of two figures, they will be exactly centered. If the folios in this instance ran to three figures, it would be necessary to add an extra nut to bring it to even picas, in which case the machine would be set for 16 picas. (30-2=28, 28÷2=14, 14+2=16). In the case of these three 12 point figures, a thin space would be placed at the beginning of the line, and in the case of two figures, a nut space, to keep the centering correct.

The foregoing procedure may be used in the case of fonts whose spaces may be combined to make even ems, such as 6, 8, or 12 point set. Where the size of the font is an odd set such as 7, 9, or 11 point, the same proced-

ure may be used, but exact centering can only be obtained by changing the setting of the left hand vise jaw adjusting screw. On the Intertype machine, when this screw is moved counter clockwise, the left hand vise jaw is moved in. When it is moved clockwise the same jaw is moved out. These movements are exactly opposite on the Linotype. Before changing this adjustment, mark the position it is in by use of a pencil. Move the jaw in or out, as may be necessary to obtain a true center for the folio. When all folios have been cast, immediately return the adjusting screw to its original position.

In casting folios, as in all casting where the machine is going at full speed, it is advisable to wipe off the mouthpiece about every 20 minutes. This is done by stopping the machine at the ejection position and inserting a mouthpiece wiper between the mouthpiece and the mold disk. Rubbing across the mouthpiece will cool it and remove the oxides which have accumulated, making less possibility of a back squirt or hot slugs.

Safety: Don't hold the first elevator slide up by hand to change matrices. A bad cut will result if dropped on the fingers.

Assignment

1. Cast a letter-spaced running head with folios from 1 to 20.
2. Cast folios from 1 to 20 flush to the end.
3. Cast center folios from 1 to 20 and from 100 to 110, indenting with the left hand vise jaw.

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THE INTERTYPE AUTOSPACER

The Intertype Autospacer is an automatic quadding and centering device. The chief differences between a quadding and non-quadding machine, as far as the operator is concerned, are the control knob and the line expansion indicator on the vise cap. The manipulation of these two controls is all the operator needs to do to get the full results of which the Autospacer is capable.

The Control Knob position determines whether the right vise jaw moves in to bring the line flush left, both jaws move in for centering, or the left jaw moves over to the line at the flush right position. Changing the position of the control knob should be done only when the machine is stationary in normal position.

The Line Expansion Indicator is provided with a scale from 0 to 3½ ems. With the indicator set at 0, the machine will quad or center every line, with or without spacebands. If the indicator is set anywhere above 0, lines tighter than the indicated amount will justify, provided there are enough spacebands. Three or four bands for each em expansion is a good rule. The usual setting for justification of lines up to 12 picas is 2 on the indicator scale. For longer measures, up to 3½ ems expansion can be used. If there are insufficient bands for the necessary expansion of a line set within the indicated limit, the line will be lost—that is, it will not be cast—the same as a loose line on a non-quadding machine. If the line is short by more than the indicated amount, it will be quadded out automatically.

The Assembler Slide is provided with a red pointer which shows on the stationary scale how much the line is short.

Assume that the line expansion indicator is set at 3. All lines to be justified must be set so that the pointer on the assembler slide is carried past 3 on the stationary scale. A line that does not carry the pointer up to 3 on the stationary scale will quad. It is advisable to avoid setting the line short by the exact amount shown on the line expansion indicator, as wear on the star wheel affects the accuracy of the reading of the stationary scale. A good rule is to allow at least ½ em leeway to be sure of the desired result.

The Delivery Slide Long Finger never needs setting on Autospacer machines. Short lines or even single matrices are

brought up to it by the short finger, and the long finger is locked automatically for safe delivery. As the delivery slide returns, the long finger is left in the 30-em position. Cleaning the notched bar and wiping it over with an oily rag is occasionally necessary. The detent fulcrum pin and spring and the detent release should have an occasional drop of oil to assure free working. Surplus oil should be avoided.

Spring-Loaded Rails have been provided in the assembling elevator and the first elevator front jaw. These rails press gently against the matrices to hold them in position. They are so adjusted as to hold the matrix line somewhat tighter on the left end in the assembling elevator. In the first elevator jaw the line stop holds the left end of the line and the rail presses more firmly on the right end of thet line.

An Automatic Line Stop is provided to control lines of any length in the first elevator jaw. During the transfer of the line, the line stop is brought back to the extreme right by the returning pawl attached to the transfer slide. If the spring-loaded **friction plunger** is removed for any reason, it is important to replace it so that the sharp corner banks against the projection on the line stop. These parts should be lubricated with powdered graphite.

Left Hand Indentions on Autospacer machines are set by manually setting the left hand jaw to the desired measure.

The working of the Intertype Autospacer is simple. The closing and opening of the vise jaws is accomplished by means of a quadding lever operated from the main cam shaft.

The motion of the quadding lever is transmitted to the vise jaws through the jaw operating lever and the right jaw or operating rack. The control knob locks this rack to the right jaw in the center and flush left positions by means of the right jaw bolt operating levers. The right jaw and its rack are disconnected at flush right. The left jaw rack is fixed to the left vise jaw. Between the racks is the coupling pinion. This is engaged with the racks in the center and flush right positions and is lifted free at flush left. As the first elevator descends, the right jaw rack is held against the increasing tension of the vise jaw operating spring by the jaw retaining latch. When the elevator reaches the vise cap, the retaining latch is tripped, releasing the rack. At this point the quadding lever is on the high point of the cam and the resulting tension of the vise jaw operating spring is at its maximum. This spring pressure closes the jaws according to the setting of the control knob.

When Casting Full Lines with Spacebands, the line expansion indicator is set for the desired amount of expansion (usually 3½). If a line is set within the indicated amount, the indicator

pin prevents the locking pawl from pushing up the stop and engaging the rack teeth. This leaves the lever free to move over far enough to allow the justification bar full scope to drive the spacebands up for justification.

Centering on the Intertype Autospacer is always accurate, provided the proper setting is correctly made. The adjustment for centering is easily made by moving the left vise jaw with respect to its rack. To do this, the centering adjusting screw, that fastens the jaw to the rack is turned. Lest this screw work loose and destroy the setting, a locking screw is provided, which bears down on the adjusting screw from the top. The adjustment has to be made with left jaw as far to the right as it will go. In this position the locking screw is directly under a hole in the vise cap and may be reached with a small screw driver. The adjusting screw is then turned by a screw driver put through the hole in the steel plate on the right-hand end of the vise cap. Turning this screw clockwise moves the center line to the left. Be sure to tighten the locking screw after this adjustment is made. The method of finding the proper center position is to set the knob for center and cast two blank slugs. A fine line may be seen across the face of the slugs in the middle where the vise jaws have met. If these slugs are placed back to back, the error from center may be seen by these fine lines. The left vise jaw rack should be so adjusted that these lines coincide exactly. For all centered lines, the line expansion indicator should be set at 0.

To remove the right jaw or operating rack, open the vise, set the vise jaws for 30 ems, push the control knob down and trip the retaining latch with the right hand. At the same time, pull the rack with the left hand until the left jaw meets the right. In this position, push the control knob up. This releases the right jaw from the rack which may now be pulled out completely. With this rack out, the inside of the vise cap is available for inspection and cleaning. Reassembling the rack is accomplished by reversing the above procedure.

The justified Quadding attachment makes it possible to set fully justified lines with indentions in half-em increments up to 15 ems on the right and indentions of any length on the left. The indentions on each side of the line are controlled separately. Indentions on the right of the line are set by lifting the justification scale control knob, and turning until the pointer registers with the desired setting on the justified indention scale. Indentions on the left of the line are obtained as usual by moving in the left vise jaw by means of the vise jaw adjusting knob. Since the left and right indentions are controlled separately, it is possible to locate the type line

in any desired position on the face of the slug. For example, suppose that a 20-em line is to be set on a 30-em slug with a 7-em indention on the right and a 3-em indention on the left. In this case, the pointer should be set on 7, the operating lever should be moved to the left and the left vise jaw should be moved in until the vise indicator rod em scale is set on 27 ems. The assembler slide, as usual, is set for the length of the line, which in this case is 20 ems.

After the length of the line has been determined and indention settings have been made, matrix lines are assembled in the same manner as on a regular machine. Since the lines are expected to justify to a predetermined length, provision must be made for the expansion of the spacebands. **The assembled lines should be slightly shorter than the measure being set.** Lines which are three picas short of the measure will justify if there is a sufficient number of spacebands for the required expansion. Lines short by more than three picas will quad out automatically if there are at least three spacebands in the line. As a general rule, all lines must contain at least two spacebands of ordinary thickness for the machine to cast.

Summary

When the control knob is up, the right jaw moves; when down, the left jaw moves; when in the center, both jaws move.

Change measure only when the control knob is up.

With the line expansion indicator set at 3½, any line more than 3½ picas short will be quadded out regardless of the number of spacebands used; lines less than 3½ picas short will be justified out if there are sufficient bands to justify; if there are not sufficient bands to justify, lines less than 3½ picas short will not cast. For centered lines the indicator should be set at 0.

When using justified quadding have at least 3 bands in the line. Justified quadding works on the right jaw only, the left jaw is set by hand as usual. The operating lever is thrown to the left. Do not neglect to return it to the right when using the quadder without jusified quadding. Don't send in tight lines on justified quadding as it may cause the measure to slip.

Assignment

1. Remove and replace the jaw operating rack.
2. Set a group of words and recast them flush right, flush left, and centered.
3. If operating the Model G, set up a line 12 picas long, indented 3 ems from the right. Recast this line indented 3 ems from the left.

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THE LINOTYPE SELF-QUADDER

The Linotype Self-Quadder, has revolutionized the setting of many forms of composition by making it possible to center accurately any length of line, quad left or right, and fill out or spread lines that are set short. It will carry out the functions of quadding right or left and centering, with lines nearly full or with lines containing but a single matrix.

The operator should make the usual scale adjustments such as setting the Assembler Slide, Ejector Blade and the Knife Block to conform with the length and point size of the slug to be cast. The line stop is automatic in its action and needs no manual positioning.

The Assembling Elevator is designed so that one or several matrices can be assembled and delivered in to the First Elevator Jaws without the necessity of moving the Delivery Slide Long Finger to support the line of matrices. The action of the Long Finger is automatic.

To set the (L. H.) Vise Jaw, for length of slug to be cast, release locking latch on adjustment rod. Pull the adjusting rod to the right as far as possible, then turn clockwise ¼ turn. The Vise Jaw can then be moved until the desired length of line is indicated by the em scale pointer. Now turn adjusting rod counter-clockwise, until the locking latch enters the slot and push rod to the left as far as possible.

Quadding to the Right—Shift the Selector Handle to the position marked "Reg. and R.H. Quad." Pull out the Left-Hand Vise Jaw Operating Lever Shifting Lever which engages the Left-Hand Vise Jaw to the Vise Jaw Control Rod. Raise the Delivery Slide Long Finger to its upper position.

Quadding to the Left—Follow exactly the same instructions as outlined for right-hand quadding. Shift the Selector Handle to the position on the Quad Indicator Plate which reads "L.H. Quad.," and move the Delivery Slide Long Finger to the lower position.

Centering—Follow exactly the same instructions as outlined for right-hand quadding. Shift the Selector Handle to the position on the Quad Indicator Plate which reads "Cent.," and move the Delivery Slide Long Finger to its lower position.

Operating as a reguiar Linotype Machine—To use the machine as a Linotype not equipped with the Self-Quadder, shift the Selector Handle to the position on the Quad Indicator Plate which reads "Reg. and R.H. Quad." Push in the Left-Hand Vise Jaw Operating Lever Shifting Lever. Make all settings that would be necessary on a regular machine before assembling a line and casting a slug. See that Delivery Slide Long Finger is in its lower position.

For the many forms of composition in which some lines are to be justified to full measure and others in the same copy to be quadded, there is provided in this device a Justification Control Lever Knob which can be moved to any one of four positions. This Knob, is located between the Left-Hand Galley Bracket and the First Elevator Slide and directly below the Selector Handle.

Controlled Justification—With the Selector Handle set for quadding, all lines would be quadded regardless of their length but this would be objectionable since many of the lines set, which would normally justify out to full length, would show an indention. To eliminate these identions, or in other words to permit these normal length lines to justify to a set measure and still have the convenience of automatically quadded short lines, a Justification Control or Spreader is provided. This mechanism permits filling out or spreading lines to full measure, that are one, two or three ems short and then, without changing any settings on the Selector Handle, it is possible also to cast a very short quadded line, thus eliminating the loss of time for shifting this lever back and forth between quad and regular.

The general action is as follows:—When the matrices and spacebands are assembled in the First Elevator Jaws, the Vise Jaw moves into contact with the line and backs off one, two or three ems as the case may be. Then the normal operation of the spacebands spreads the line out to the new position of the Vise Jaw. If the line is not justified out, owing to the line being too short, the Vise Jaw then comes in against the line, thus quadding automatically.

If the lines are set more than three ems short, no spread takes place and the line is automatically quadded.

With the Selector Handle set for Left-Hand Quadding and the Justification Control Lever Knob set in the top normal position, each line would be quadded to the left.

With the Justification Control Lever Knob moved down to the second position, each line that is set not more than one em short of full measure will automatically justify out to full measure provided there are sufficient spacebands in the line to

spread one em. Lines set more than one em short of full measure will justify out one em and the remainder of the measure will be quadded.

With the Justification Control Lever Knob set in the third position, the action will be the same as explained above, except that the line will justify out two ems providing there are enough spacebands in the line to permit a spread of two ems. If the number of spacebands in the line will not permit a spread of two ems, the line will spread the maximum permitted by the spacebands and the remainder of the measure will be quadded.

With the justification Control Lever Knob set in the fourth position, or lower hole, the same action takes place as above, except that in this position, a line three ems short of full measure will automatically justify out to the full measure providing there are sufficient spacebands to permit it. If the number of spacebands in the line will not permit a spread of three ems, the line will spread the maximum permitted by the spacebands and the remainder of the measure will be quadded.

When Automatic Justification is not desired, the Justification Control Lever Knob should always be kept in the top hole or first position.

To Cast Blank Slugs—Blank slugs can be cast with the Selector Handle in any of the positions described, but the Shifting Lever must be pulled out when the Selector Handle is at position marked "Reg. and Right-Hand Quad." It is merely necessary to pull the Starting Handle to permit the Cams to revolve and bring the Vise Jaws together in position for casting blank slugs.

Selector Handle—Shifting the Selector Handle at any time before Vise Jaws have returned to normal position will cause jaws to be out of time with Indicator.

If the movement of the Vise Jaws does not coincide with the reading on the Quad Indicator Plate of the Selector Handle, it indicates that the Selector Handle has been shifted out of time.

To position the Selector Handle to coincide with the movement of the Jaws, depress the Vise Jaw Locking Toggle Lever, which is below the Left-Hand Galley Bracket. This causes the Vise Jaw Control Rod to travel downward. Observe the movement of the Vise Jaws as the Vise Jaw Control Rod travels downward. Shift the Selector Handle so that Quad Indicator Plate reading coincides with the movement of the Jaws. Then allow Control Rod to return to normal position.

Matrix Detent—The First Elevator Jaw is equipped with a Matrix Detent. Its purpose is to steady the last matrix of each line delivered into the First Elevator Jaw. It will be

observed that when quadding left or centering, the last matrix is moved away from the First Elevator Jaw Spring Pawls. In this position, the Matrix Detent comes in contact with the last matrix and prevents it from turning and falling off the First Elevator Jaw as the First Elevator rises after casting. Its action is equally effective in recasting.

The Matrix Detent is depressed by the action of the Line Stop to allow the line of matrices to enter the First Elevator Jaw. As the matrices enter the Jaw, the Line Stop is forced outward allowing the Matrix Detent to hold the matrices in position. When the line of matrices is being transferred to the Second Elevator Bar, the Transfer Rod attached to the Transfer Slide carries the Line Stop fully into the First Elevator Jaw. At this position the Plungers are depressed, which action withdraws the Matrix Detent so that here its no tension against the matrices at this position.

L.H. Vise Jaw Safety Detent Operating Lever—The Safety Detent Operating Lever contained in the Left-Hand Vise Jaw should be kept clean and free from small particles of metal, which may prevent it from operating freely. It is the pressure of the matrices against this Lever that operates the Pump Stop Lever Operating Lever through the movement of the Safety Detent Bar.

The Safety Detent Operating Lever should always extend beyond the face of the Left-Hand Vise Jaw after the matrices have risen from between the Vise Jaws. If this lever remains flush with the face of the Left-Hand Vise Jaw or remains depressed, the Pump Stop Lever will be open, which would allow machine to cast with a short line or with jaws open.

Pump Stop Lever—The Pump Stop Lever is set in the factory to clear the Catch Block on the Pump Lever by 1/64 of an inch or less when the Plunger descends. This is a very important adjustment and should be checked often. Adjustment is made with a full line of matrices and spacebands

On quadder equipped Linotypes it is necessary to disconnect the quadding mechanism before the vise can be lowered to the second position.

Assignment

Using machine number three which is equipped with the automatic quadder, set the left hand vise jaw to several different measures. Cast slugs right, left, and centered. Try out the spreader in different positions. Disconnect the quadder and place it in operation again. Use the testing lever to check. Throw the selector handle out of time and then re-time it. Use this sheet for copy for the balance of the session.

BUTTED COMPOSITION—I

Whenever one or more lines of type are placed together so as to read across as one line, they are said to be butted. This type of composition, usually referred to as "double up composition" becomes necessary whenever a job comes into the shop, the width of which is wider than the longest line the machine can cast.

Since the slugs are to be butted together, it is first necessary to check the machine for certain settings before proceeding with a job of this nature. In a previous lesson, you were required to change the adjustment of the left hand vise jaw. If this was not replaced correctly, the jaw may be in too far, and because the matrices do not come fully to the end of the slug, a river will be observed when they are doubled up, as follows:

Fourscore and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure. We are met

If the jaw is too far out, the letters which project beyond the ends of the slug will be crushed in when the form is locked up.

on a great battle-field of that war. W have come to dedicate a portion of that fiell as a final desting-place fo those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this.

The same necessity for perfect alignment is also true of the right hand vise jaw, but since this is almost never readjusted, little attention need be paid to it except to check the alignment of the face with the body of the slug.

It is also necessary in double up composition that the slugs be type high (.918 inches) on both ends. If one end is higher than the other, it will show on the press and either punch through the paper, or bear off the adjacent letters.

But in a larger sense, we canno **dedicate** — we cannot consecrate — **we cannot hallow** this ground. The b**rave men, living** and dead, who strug**gled here, have** consecrated it far ab**ove our poor** power to add or detract. **The world will** little note nor long re**member** what we say here, but it can **never forget** what they did here. It **s for us, the** living, rather to be dedi-

It is of the utmost importance that the slugs are perfectly parallel in reading across. If one end of the slug is slightly thicker than the other, there is a noticeable discrepancy between the lines, and the deeper the job is, the more obvious this discrepancy becomes.

cated here to the unfinished work which they who **fought here have thus far s nobly advanced. It is rather fo**r us to be here dedicated to the great **task remaining before us—that fro**m these honored dead we take in**creased devotion to that cause for** which they gave the last full measure **of devotion; that we here highly res**olve that these dead shall have not **have died in vain; that this nation, u**nedr God, shall have a new birth of

One method to partially overcome trouble due to slugs being out of parallel is to cut two picas off the blank end of slugs ending on the first half of the line and cast up other blanks two picas longer than half measure for the corresponding right hand side.

When the machine has been adjusted to correct any of the previously noted faults, which may have been found, we may begin to set the job by one of several methods.

In the first method, the full measure of the final job is divided in half. Set the assembler slide and the left hand vise jaw to this half measure.

Since the slugs are to be butted, the first half need not end on a word, and in fact it is better if it does not. However, if good spacing makes it necessary to end the first half with a full word, remember not to use a spaceband on the end of the line. Instead, use a nut space at the end of the first or the beginning of the second half of the pair. It is also possible to put a thin space in both of these positions to make a nut when butted.

On newspapers where time is too short to permit making any adjustments and the doubled up portion seldom makes more than a paragraph, it is better to break on full words in the middle of the slug if the vise jaws are imperfectly adjusted.

The most difficult feature of setting twin slug composition is to get even spacing. Since two slugs are to read across as one, the spacing in both halves of each pair making a line must be as nearly equal as is possible.

In order to get this equal spacing, when the first slug of the pair has been set, notice how many space-bands are in the line, and how much space remains to be justified out. Now push the control handle in and raise the assembling elevator so that this first half is delivered to the first elevator. Do not let the control handle out, but proceed to set the second line of the pair. Compare the space bands and unjustified space in the second half with that in the first half. If the space needs equalizing, between the pair of lines, this may be done by transferring matrices from one half to the other. To make this transfer, utilize the method given in the previous lesson on folios.

If the machine advances too far when you wish to change matrices in the first elevator jaws, do not back it up. So long as the mold disk has not advanced the first elevator slide may be raised and held up with the left hand while changes are made with the right. You may now cast the two lines and proceed with the next pair in the same manner until the job is completed.

Be sure that the line delivery carriage has returned to normal position before sending in the second half of the line. If the line in the assembler elevator is held in the path of the line delivery carriage, it will be pied or the line delivery link will snap out of place.

When an operator is fully competent, it is perhaps a little quicker to send through the first half of the line, throw it away and reset it rather than to change the mats by hand when respacing is necessary.

Generally, in setting doubled up composition, if the first half of the line is sent in with approximately regular spacing, it will not be noticed if the second half is somewhat more tightly or loosely spaced.

In the case of headings which are to be set across a double slug, set up the head, using space matrices between the words. If the head makes half a doubled up line or less, take the matrices out of the assembling elevator, lay them on the copy tray and divide them in half as nearly as possible. Run down quads and spacebands and place the first half of the matrices composing the head at the end of the line and cast. Now place the second half at the beginning of the next line, quad out and cast.

If the head makes more than half a doubled up line, set up as before, using an even number of quads to fill out the second half, allowing some space short which will later be taken up by the bands. Count the number of quads needed to fill out as you drop them. Both of these lines are sent away without casting. Now reset the heads, placing one half the number of quads you had at the beginning of the first half of the line and the balance at the end of the second half of the line. This is quicker, although not quite so accurate as taking all the mats and quads out of the assembler and dividing them in half.

If the head makes more than a doubled up line, you would combine both the above procedures.

Some operators who find themselves confused as to which part of a line they are working on, may place a matrix on the copy tray and shift it from one side to the other in order to keep track of the lines, especially when more than two slugs are used to make a single line.

Assignment

Using the above method, set a pan of twin slug composition. Check the slugs before starting. Be careful in spacing.

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BUTTED COMPOSITION—II

In the previous lesson, we set doubled-up composition by dividing the measure in half. That method is acceptable for newspaper work, and in most job offices. But no matter how well that method is done, if a proof is held to the light at a certain angle, the hypercritical eye can detect a river which shows at the junction of the slugs.

For this reason, advertising agencies and some job shops will not accept the half measure procedure, and in order to overcome the river, another method of setting double-up composition called the stagger method is used. With this, as with the previous method it is first necessary to check the slugs for height, thickness and alignment. Instead of setting the assembler slide and vise jaws to half measure however, they are set 12 points more than half measure. The liner must be at least 6 points longer than half measure.

Now proceed to set the job as before, giving equal attention to the spacing of both halves of the line, but, at the beginning of the second line of each pair, drop in space matrices equal to one pica. Do this for 6 lines or 3 pair. For the succeeding 3 pair, drop the extra space on the beginning of the first half of each pair, setting the second half full. The result will look like this:

Fourscore and seven years ago our f athers brought forth upon this
continent a new nation conceived i n liberty and dedicated to the
proposition that all men are creat ed equal. Now we are engaged in
a great civil war, testing whether that nation or any nation so con-
ceived and so dedicated can long endure. We are met upon a great
battlefield of that war. We have come to dedicate a portion of that
field as a final resting place for t hose who here gave their lives
that that nation might live. It is a ltogether fitting and proper that
we should do this. But in a larger sense, we cannot dedicate, we cannot

When the extra space is cut off and the slugs are butted the break alternates by one pica every 3 lines and is not so easily detected.

This method is also preferable when setting large faces which should be staggered on every line as it permits better spacing.

In selecting the space matrices which are to be dropped at the front of the line to make one pica, great care must be exercised. It is not sufficient to measure one or two matrices with a gauge, because if the mats make a quarter point more or less than a pica, it will not be easily detected.

If you think, for example, that a mut and nut quad of the font you are using make one pica, measure at least ten of these units. Since any error is multiplied by ten, it will more readily be observed, and a one-quarter point error in a single unit will show up as a two and one-half point error in the ten units measured.

Assignment

Using the above method, set a pan of twin slug composition. Check the slugs before starting to work.

A variation of this last method is sometimes accomplished by the use of two molds. If, for example, we wished to set a job in 8 point type, 50 picas wide, the following procedure is used: One mold is set for 8 point 24 ems, and another for 8 point 26 ems. The operator casts one line on one mold and thereafter two lines on each mold. When placed together, no saw work is necessary. This takes more time, however, since it is necessary to reset the mold disk and left hand vise jaw every two lines, the assembler slide long finger being set to the wide line and the short ones judged by eye. The ejector blade remains set at 24 picas.

Another occasional variation of the above method is to use a run down, before the short line only, which obviates changing the left hand vise jaw.

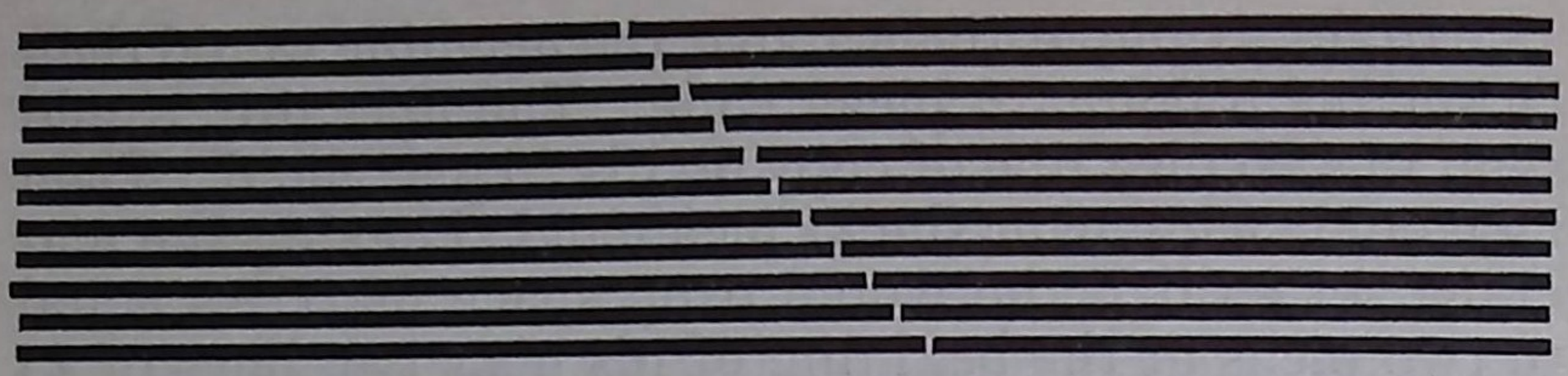
In the example given above, the machine would then be set for 8 point 26 picas wide. The operator would send in a 26 pica line of copy on his 26 pica mold. Then he would swing over the 24 pica mold. Leaving the machine set as it is, he would drop space matrices equal to two picas at the begining of his next two lines of 24 picas. Since these space matrices overhang the liner in the mold, the resulting line will be only 24 picas long.

Just above, it was mentioned that great care must be used to get exact measurement. In the method now under discussion, we are in a position to test the measurement by dropping down the spaces we believe to equal two ems, followed by a lower case p. Quad out the rest of the line and cast. The shoulder of the p matrix should overhang the end of the slug about .002 in. If it does not, we must change our run-down, until it does. If the space matrices will not make this satisfactorily, try different lower case letters of varying thickness, such as, y, l, i, etc. If it is necessary to use these matrices to get perfect line-up, be sure to place at least a thin space in your run-down between your matrices composing the run-down, and the beginning of the matrices composing the copy. This is necessary because if the lower case mats are placed next to the copy mats without an intervening blank space, they will cast as an overhang.

Still another method which is occasionally used in very particular jobs for which the customer is willing to pay the extra cost, is to put in a 30 pica liner. If the job is to be 50 picas wide, the slugs are set as follows, readjusting the assembler slide and left hand vise jaw for each half line:

20—30	24—26	28—22
21—29	25—25	29—21
22—28	26—24	30—20
23—27	27—23	Repeat

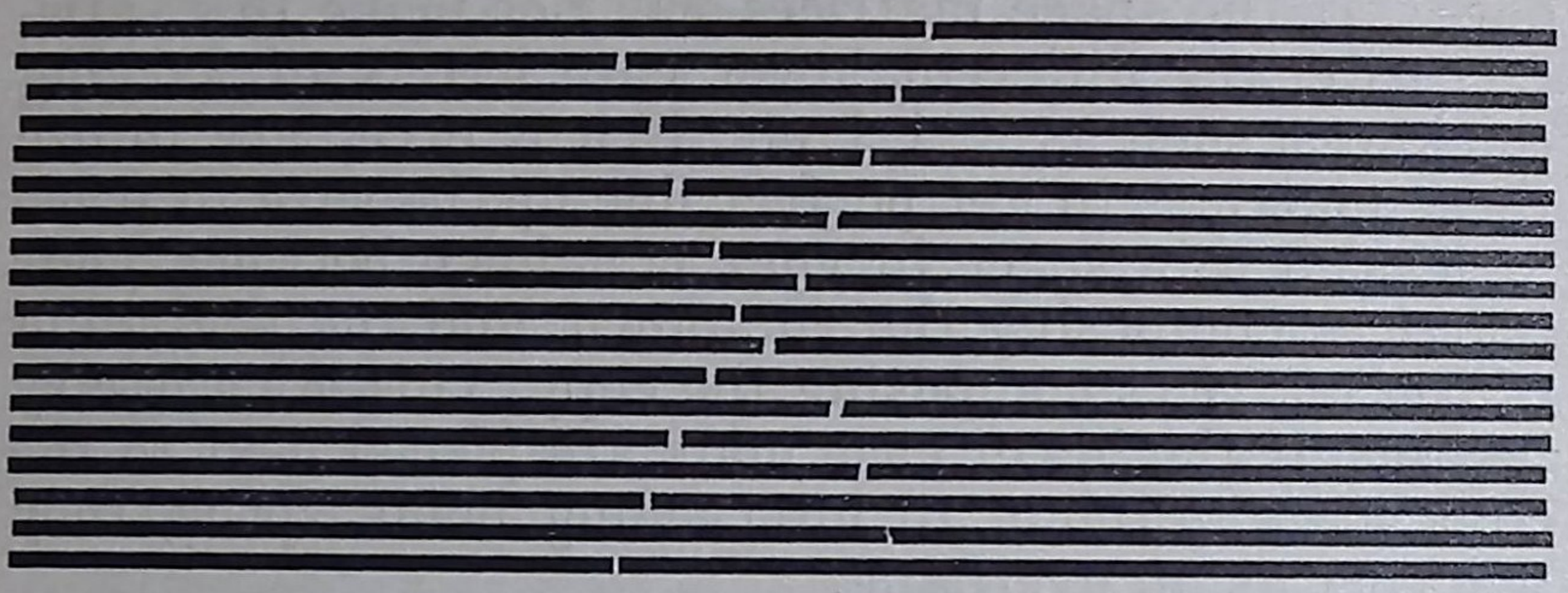
When butted together, the slugs will appear something like this:



Equally good results can obtained with some saving of time in making adjustments in setting the same measure as follows, since the machine is readjusted three instead four times for each two full lines:

30—20	28—22	26—24	23—27	21—29
20—30	22—28	24—26	27—23	29—21
29—21	27—23	25—25	22—28	20—30
21—29	23—27		28—22	Repeat

When butted together, the slugs will appear something like this:



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TYPEWRITER COMPOSITION

Machine set typewriter type was formerly used only in job shops, but the recent vogue for setting newspaper advertisements in typewriter faces has lead to its introduction in this latter field as well. Typewriter faces are made only in light face and medium bold.

In newspaper work, since the printing is done either from a stereo plate or directly from the slugs, the medium bold face is used. This face is also used in job work where the run is ordinary letter press.

In the better quality of job work, however, the light face matrices are used, and a silk sheet is interposed between the form and the paper, and the slugs print through the silk, onto the stock. This gives the impression a slightly bolder imprint, and also the same characteristic appearance of impression which is seen in a typewritten letter where the characters are impressed through the typewriter ribbon. Later, when the salutation is typed onto the printed stock, the two processes will match perfectly and give the appearance of a personalized letter, completely typed and addressed to the individual recipient.

Therefore, in using the typewriter face for this work, the primary objective is to make the machine-set type duplicate the typewriter characteristics as closely as possible. For this reason, it presents several peculiarities.

When a typist wishes to obtain emphasis on a job, it is done by underlining the passage, since her machine does not have bold face, small caps or italics. The typesetting machine faces are consequently made to imitate the regular face in the roman position, and when the mats are raised to the auxiliary position they are identical with those in the roman position, but underscored.

On the typewriter, each character is the same set width, which is duplicated in the machine matrices. For this reason the em dash is reduced in size to a nut. There is a very

slight difference between the hyphen and the dash, the latter being a trifle heavier and wider. In practice, some firms use either two hyphens or two dashes to make an em dash. A better business practice however is to leave a nut space on each side of a hyphen thus:

Now - hurry!

The mut, nut and thin space channels all contain nut spaces. When raised to auxiliary position, the mut and nut spaces become an underscore rule or low aligning dash rule. Mut and nut leaders also are the same thickness and in normal position may be used for periods, or periods may be used for leaders. When leaders are placed in the auxiliary position they are nut spaces.

The left, or opening quotation mark is a double quote on a nut body. Since the mark is straight up and down, bearing no distinguishing curve, " this is used for either opening or closing double quotes.

The apostrophe, or closing quote key gives a single quote ' on a nut body, and this is used for either apostrophe, opening or closing single quote mark. Do not use two single quotes to make a double mark.

Since there are no ligatures on the typewriter, they are not found in the typesetting machine, and some of the channels are used to hold special commercial characters. In the accompanying diagram, keys rung show a change from the standard machine layout.

On the typewriter, the spacing between the words is the same unit as occupied by the individual letters. The margin at the left is uniform, but the right hand side runs ragged Do not divide words unless an unusually bad spacing will result. The preferred style for paragraphs is to run them flush, allowing a blank line between, for separation.

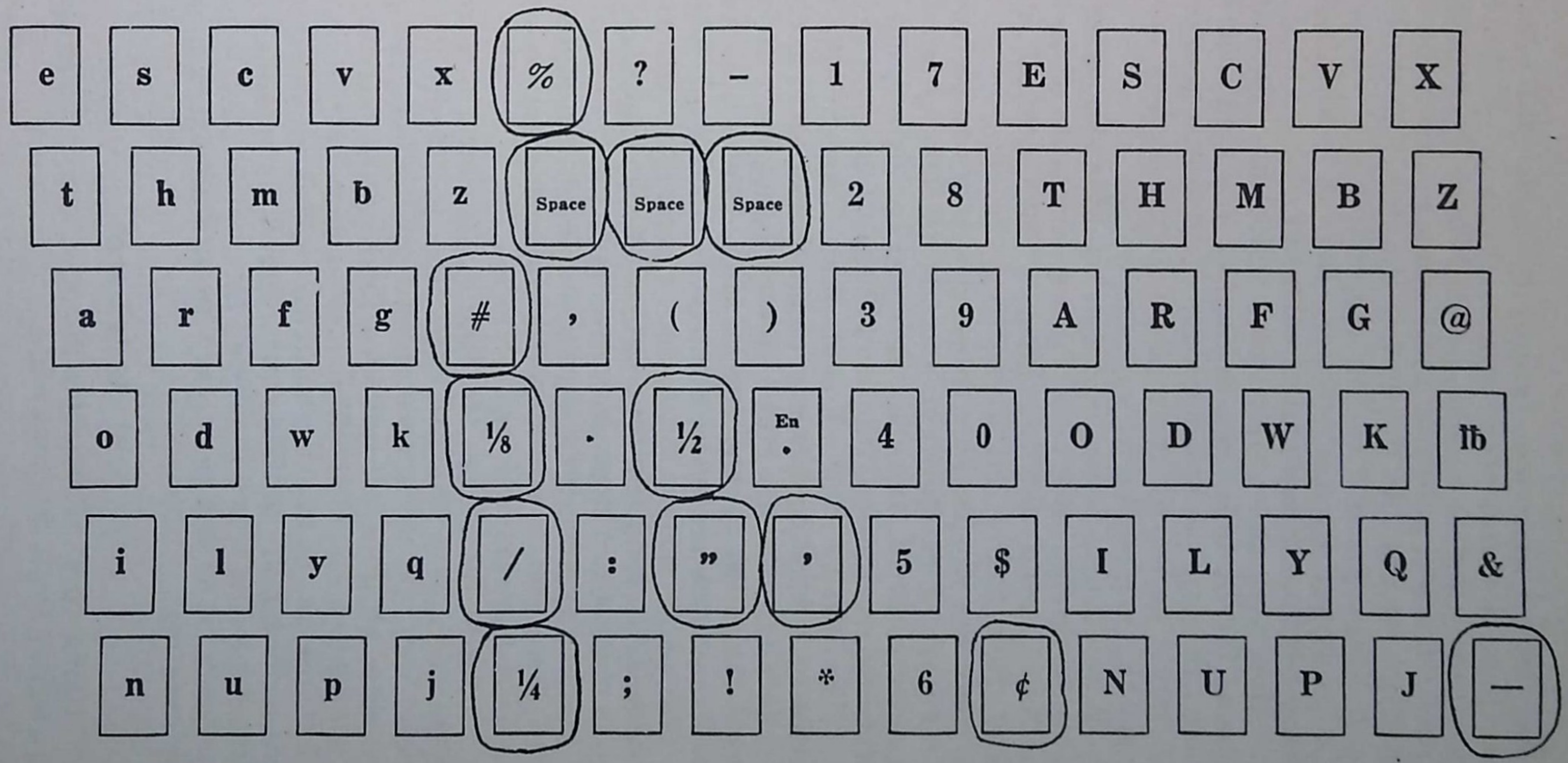
Since the spacing between the words must be kept uniform, it is necessary to use space matrices instead of space bands. All spaces in the typewriter font being the same size, use any of them between the words. Where the measure is less than 30 ems, the spacebands and quads necessary for justification are placed at the right hand end of the line. Do not place a spaceband on the extreme end of the line where it will rub against the right hand vise jaw.

Since many lines are encountered where only two, or perhaps, one spaceband can be used, thick or extra thick spacebands are preferable for this kind of work.

The operator will at first find some difficulty in dropping spaces instead of bands between the words, but this will come more easily with practice. If you are operating one of the

Intertype Keyboard Diagram No. 23—Typewriter

Standard Typewriter Diagram



newer model linotypes, it may be easier for you to lock the spaceband locking stud and to throw over the mut or nut operating lever extension knob. When the spaceband key is struck, this will give you a nut space between the words, without a spaceband. At the end of the line, unlock the spaceband locking stud and strike the spaceband key. This will drop a band, followed by a nut space. Repeat locking and unlocking at the beginning and end of each line.

However, the majority of imitation typewriter work is done as facsimile letters, printed on 8½ x 11 inch stock. This means that in the absence of a 42 pica machine on which the job would be set by the method just described it is necessary to set the job as doubled up composition.

When this is to be done, the machine should be set for half the measure plus one pica. At the beginning of the first half of the line making each pair, drop a space, a band, a space and a band. Now follow out by setting the copy using quads only, between the words. This causes the mats to be driven flush to the right. Since the matrices are all the same size, and the same number of units are dropped in each group making the first half of the line, they will always line up at the left.

The second half of each line is set by the method described for less than thirty picas. These mats are driven flush to the left, and the right side runs ragged. Because of the space taken up by the justification, the printing surface will not exceed the measure, although the body of the butted slugs is two picas wider. Since the spacing is uniform, it is not necessary to hold the first half of the line, as was done in previous methods of doubled up composition.

When typewriter composition is set on a machine equipped with an automatic quadder, it is not necessary to use any spacebands in the composition.

On the Intertype, the line expansion indicator should be set at zero. On the Linotype, the justification control lever knob should be set in the top position. Where the job is set on one slug, all lines are quadded flush to the left. Where the job is set on two slugs, the first half of each pair must always contain the same number of matrices and is quadded to the right; the second half, which runs ragged, is quadded to the left. Since no extra space is needed for justification when using the quadders, it is not necessary to add an extra pica to half of the measure.

Assignment

Using this information sheet as copy, set it up in 10 point typewriter type, 40 picas wide.

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TABULAR COMPOSITION—I

In setting tabular composition, the basic principle is to take the variable groups of matrices which appear in the columns and to make these into a constant width by adding space unit matrices as necessary. Once this principle is understood, tabular matter offers little more difficulty than straight composition, since it is only necessary to be able to count accurately.

Fingering. In this type of work, only the right hand is used to strike the tabular part of the job, and a base position and the use of a fingering system for this hand will make it possible to set type with almost the same speed as straight matter.

In order to train the right hand to find the base position without looking at the keyboard, a piece of tape may be wrapped around the assembling elevator lever shaft which runs across the bottom of the keyboard. The tape should be placed on the shaft between the em leader and capital N keybuttons. When the base of the palm is slid across the shaft until it strikes the tape, the thumb will be over the en leader, the first finger over the 2 and the second finger over the 8 keybuttons.

The first finger should be used to strike the 1 2 3 4 keybuttons; the second finger for 7 8 9 0; the thumb for 5 6 $, . In setting leaders the little finger strikes the em leader and the first finger strikes the en leader. A single space is usually

Assignment I

Using the above fingering system, set the following table in 8 pt. 16 picas, dropping a spaceband between each group of figures.

1234	1234	1234	1234	7890	7890	7890	7890	1717
1717	1717	1717	2828	2828	2928	2828	3939	3939
3939	3939	4040	4040	4040	4040	5656	5656	5656
7171	7171	8282	8282	9393	0404	1278	1279	3490
3490	8721	8721	0943	0943	1287	1287	3409	3409
5604	5604	5604	0456	0456	6540	6540	6540	9043
9329	9328	2871	2871	2871	2871	1827	1827	1827
8239	8239	9328	9382	9043	6593	6582	6571	1793
6754	7645	5328	9386	1941	1920	6302	6201	7865

struck with the thumb. Otherwise, the first finger strikes the em, the second for the en and the third for the thin spaces.

The next step is to notice the different bodies on which the matrices are stamped. Two en spaces always make an em. In fonts from 8 to 14 point, two thin spaces make an en. Below 8 point, the thin spaces may be wider than 4 to the em. This is because certain characters such as the period and the comma, which are always on the thin space body, must be exaggerated for better visibility in the smaller sizes.

On the thin space body we have the following: thin space comma period downstroke quotes.

On the nut space body are: the nut space nut leader 1 2 3 4 5 6 7 8 9 0 ( ) $ * ? † ‡ § nut fractions nut dash [ ].

On the em space body are: the em space em leader em dash + % @ = × em fractions.

By using the different sized spaces and characters we can make the width of the column portion of the table the same on every line. Spacebands are not used in the column portion of the table because the amount they drive up on each line would be different, and this would introduce an uncontrollable variation which would destroy the alignment of the matrices in the column. The spacebands are instead placed between the words in the line. These words, the bands between them and the leaders, if any, up to the beginning of the column are designated as the "stub" of the table. Great care must be taken in the justification of the stub, as usually there are very few spacebands in it, and unless the line is rather closely set, the spacing will be too wide. The line should be tight enough so that the starwheel almost hesitates. If it will not take another en leader, it is sometimes possible to put a period in with the leaders. This of course is not possible if the weight of the period varies from the weight of the leaders as would be the case in a bold face font, and should only be done when quarter em leaders are not available. When the line ends with an initial or an abbreviation, it is not necessary to use a period when suitable weight leaders follow close up.

If only one word appears in the line before the leaders, the band must be placed between the word and the leaders, but this should not otherwise be done. The purpose of the leaders is to carry the eye from the words to the figures and consequently bands are not placed between the leaders, nor should there be too much of a gap between the end of the leaders (which always align at the right) and the beginning of the

figures in the column. This amount of space will, of course, vary with the amount of figures in the column, but it should never be less than an en space between the end of the leaders and the widest group of figures (this does not apply to a total line), and preferably this should be at least an em space.

Where the wording in the stub will make more than one line, the end of the word in the first line must not extend beyond the leaders, with which it should align. The carry-over is usually indented two em quads, but in the case of a very short stub this may be reduced to one mut.

Assignment II

Following is a list of the proper speeds of various parts of the Intertype machine when using standard 14 tooth 12 pitch motor pinion in R.P.M.

Motor	1140.
Driving gear	70.93
Cams	6.45
Intermediate shaft	274.26
Distributor screws, A, B, C, D	302.63
Distributor screws, A, B, C, D, with side magazine	264.80
Distributor screws, E	265.11
Distributor screws, E, with side magazines	265.11
Distributor screws, F	264.80
Distributor screws, F, with side magazines	264.80
Keyboard, rubber rull shaft, fast	357.73
Keyboard, rubber roll shaft, slow	274.26
Keyboard, rubber roll shaft, S. M. No. 2, with friction drive	223.76
Keyboard, rubber roll shaft, S. M. No. 2, with Micarta gear drive	274.26
Keyboard, rubber roll shaft, S. M. No. 3, with Micarta gear drive	274.26
Keyboard, rubber roll shaft, S. M. No. 3	313.44
Assembler star wheel, Assembler T-2160, T-3110	589.08
Assembler star wheel, Assembler T-1800, T-2800	228.76
Matrix delivery belt pulley, T-2160	696.19
Matrix delivery belt pulley, T-1800, T-2800, T-3110	769.00
Mold cooling blower impeller shaft	3590.31
Pi stacker star wheel	445.67
Pi stacker star wheel with side magazine	457.10

	FT.P.M.
Matrix delivery belt, T-2160	410.09
Matrix delivery belt, T-1800, T-2800, T-3110	452.98
Matrix on distributor bar, A, B, C, D	12.61
Matrix on distributor bar, A, B, C, D, with side magazine	11.03
Matrix on distributor bar, E and E with side magazine	11.05
Matrix on distributor bar, F and F with side magazine	11.05

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DECIMAL MEASUREMENTS OF BODIES FROM 1 TO 72 POINTS	
1 Point	.01383
2 Point	.0277
3 Point	.0415
4 Point	.0553
5 Point	.0692
6 Point	.083
7 Point	.0968
8 Point	.1107
9 Point	.1245
11 Point	.1522
12 Point	.166

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TABULAR COMPOSITION—II

Shop practice varies in the placement of the dollar sign ($) when it appears in tabular composition. Some shops insist that all dollar signs appearing in the column must be aligned vertically, as it makes for better typography. Other shops insist that the $ be placed next to the figures, since if the first group of figures in the table is short, and the group of figures in the total line is very long, there would be too great a gap between the sign and the figures on the first line if it is aligned with the one on the total line. In the case where a common alignment is used, it is permissible to run the leaders up close to the $ mark on the first line, while the $ on the total line will be just to the right of the leader alignment. In all cases, each column of a monetary table begins with the dollar sign.

Where a total appears, it is preferably indented at least three muts, with no less than two permissible. Depending upon shop practice, the leaders following the word "Total" may line up with the leaders in the stub, or they run all the way across to the figures. When total lines are such as shown in the table on page 2 of this sheet, it is possible to run the leaders close up to the word "Total" by placing the bands necessary for justification at the beginning of the line instead of between the word and the leaders; but in order to make these words line up, it will be necessary to place the same amount of justification (two quads and two bands) and the same amount of leaders on each of the lines. The ruled line which appears over the group of figures constituting the total is set with mut dashes. This line must be at least as wide as the figures including the dollar sign, never less. For better alingment, nut dashes are available to run pi, or in the regular em dash channel. Recast as many of these lines as appear in the table.

That portion of the table containing the figures and the spaces which equalize the columns, is usually referred to as the "drop" and in order to find the number of characters in the drop, the operator sets first the line which contains the widest group of figures. If there is a total, or a grand total, in the table, this then is the first line set. Making allowance for the

space between the end of the leaders and the beginning of the figures, counting will show how many units of space are contained in the drop. In the following table then, the drop would be 10 nut and 3 thin spaces, the equivalent of which must appear on the end of every line. If the font in which the table is set runs 4 thins to the em, the reduced drop is 5 muts, a nut and a thin. If not, it is 5 muts and three thins. For greater convenience in counting, operators prefer to make the drop an even number of muts (in this instance 6) whenever possible.

When the widest drop line has been set, stop the star wheel so that the points are horizontal and vertical. Now take out the matrices constituting the drop and trip the assembler slide brake so that the end of the stub is brought back against the tooth of the star wheel.

If the machine is equipped with a pointer over the assembler slide, use a pencil (colored preferably) to make a mark below the pointer. If the machine has no pointer draw a line across the assembler slide and any stationary part at this same position. Now when the operator is setting, he watches the mark on the slide approach the pointer or the other mark he has made and then when these two coincide, he knows it is time to begin his drop.

Assignment I

Set the following table, marking the slide as described in the foregoing.

THE OLD AGE PENSION FUND

The following is a summary of the receipts and expenditures of the fund for fiscal year closing June 20, 1939:

Receipts

June 21, 1938, balance in fund	$2,075,334.95
Seven-eighths of 2 per cent assessment	2,591,604.03
Interest for year	59,658.44
Pensions returned	2,154.48
Bequest Edwin T. Draper	5.53
Total	$4,728,757.43

Expenditures

Paid to Pensioners	$2,333,024.00
Assessment refunded	150.53
Total	$2,333,174.53
Balance in fund June 20, 1939	2,395,582.90
Total	$4,728,757.43

Even if the table is correctly set, there are several things which may throw the alignment off. If the matrices are bent, the few spacebands used may not drive up with sufficient pressure to completely flatten them out. However, the most common cause of mis-alignment is wrong font space matrices. Although these may be the same point size as the font in use, they may have an entirely different point set. On the other hand, many space matrices may have a different mark on the side and still be the correct size and set. You may notice that thin spaces particularly are marked for their size measured in thousandths of an inch as: .0277, .028, etc. Before setting a long or difficult tabular job, all the spaces in the font should first be checked.

In setting multi-column tables, wherever it is practical the same amount of spaces should be used in each column and equal spacing between the columns. Remember too, to make the column drop in even quads when possible.

When headings appear over the columns, set a slug which will show the complete drop. Next set up the heading using spaces, not bands, between the words. Take these matrices out of the assembling elevator and stand them on the slug showing the drop. This will show the approximate spacing necessary to center the heads. The bands necessary to cast the line are now inserted in one place (usually to drive the line flush right or left) and the line is cast. Do not permit these matrices to distribute. Just as the second elevator begins to rise, the control lever is thrown in with the right hand. The left hand is held over the second elevator, not to stop the machine, but to prevent the second elevator from going up too far when it is overbalanced by the weight of the first elevator. The matrices may now be removed from the second elevator bar without getting up from your chair. Replace the mats in the assembling elevator and let the machine go around to normal position. Lay the slug just cast on the slug showing the drop and see how they line up. If necessary, change the spacing, and repeat the process, but be sure to always place the bands in the same portion of the line each time it is cast. Do not let the line distribute until you are completely satisfied with the line-up.

Where the heading makes more than one line, a great deal of discretion is allowed the operator. If the head is wide and the columns narrow, he may set the head first and determine the drop later by increasing the space between the columns, where there is room. If this cannot be done, he may break the head into several lines, or he may use almost any recognizable abbreviation to get it in. Sometimes the heads may run vertically instead of horizontally over the columns. In the case of a long

column with a few figures at the top, which becomes wider at the bottom, the head may be thrown off true center, to appear optically centered. There are no set rules for this type of work It is a matter of the operator's judgment and the customer's acceptance of necessary changes. In the better class of work hair spaces are used for perfect centering.

Assignment II

Set the following tables in 8 pt, 16 picas wide, using the procedure described to center the headings.

	B.AV.	ab	r	h	rbi	o	a	e
Sturm, 1b	.244	4	0	2	1	10	0	0
Crosetti, ss	.228	4	0	0	0	4	6	1
Henrich, rf	.272	4	1	1	1	0	0	0
DiMaggio, cf	.356	3	0	1	0	1	0	0
Gordon, 2b	.281	3	1	1	0	2	3	0
Dickey, c	.281	3	1	1	0	2	3	0
Rosar, c	.300	2	0	0	0	5	0	0
Selkirk, lf	.230	2	0	0	0	4	1	0
Priddy, 3b	.212	2	1	0	1	0	3	0
Gomez, p	W15-L4	2	1	1	0	0	0	0
Branch, p	W5-L1	0	0	0	0	0	0	0
Totals		27	4	6	3	27	13	1

The following table shows the average payment per member to the old age pension fund since it was established in 1908, as compared to the average cost per member of paying old age pensions.

Fiscal Year	Number Pensioners	Average Assessment	Average Cost
1909	542	$4.48	$1.50
1910	642	4.76	2.23
1911	808	4.87	2.40
1912	1,038	4.96	*3.15
1913	1,108	5.12	4.36
1914	1,210	5.20	4.52
1915	1,342	5.13	4.99
1916	1,440	5.20	5.86
1917	1,509	5.43	5.73
1918	1,501	5.72	5.65
1919	1,493	6.32	5.17

Safety: When only one spaceband is used to cast a linotype slug, greater safety is obtained when that band is at the left side of the line. Why?

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TABULAR COMPOSITION — III

Should the stub, or one of the columns have like words on successive lines, these should be aligned just as figures would be. Between such words, use space matrices which will as nearly as possible equal the thickness of the bands in the balance of the line when justified.

During the fiscal year beginning June 21, 1938, and ending June 2, 1939, each member on the roll who was entitled to the pension for the full time received thirteen checks covering the following pension periods:

Four weeks ended June 25, 1938	$32.00
Four weeks ended July 23, 1938	32.00
Four weeks ended August 20, 1938	32.00
Four weeks ended September 17, 1939	32.00
Four weeks ended October 15, 1938	32.00
Four weeks ended November 12, 1938	32.00
Four weeks ended December 10, 1938	32.00
Four weeks ended January 7, 1939	32.00
Four weeks ended February 4, 1939	32.00
Four weeks ended March 4, 1939	32.00
Four weeks ended April 1, 1939	32.00
Four weeks ended April 29, 1939	32.00
Four weeks ended May 27, 1939	32.00
Total	$416.00

Sometimes an operator will find that the width of the stub is just slightly in excess so that he is unable to get the proper drop in the tabular portion, or that the break-over in the stub will be very bad if he uses the proper drop. In this instance he may do some "faking" by replacing the bands in the stub with thin spaces and placing the bands necessary for justification between the end of the stub and the drop. Naturally if this makes the end of the stub too far out of line, the proof reader will mark it, so discretion must be used.

This slug is an example of "faking" the spacing in a tight line.

If the table runs wider than the machine can set, it is necessary to double up on two or more slugs. When this is done, do not break between the figures of a column, but between columns, taking care to keep the spacing between them as equal as possible. In this work the bands are usually placed on one end of the following slugs. If the layout of the copy is such as to permit it, the operator will usually set the first slug of the table all the way down, then the next slug and so on. This is because it is easier to remember the drop down a single column of slugs, than it would be to remember the drop across a number of columns when it may vary on each column. When this is done, the operator should turn a slug upside-down at the foot of each column to facilitate the make-up.

In newspaper work where the copy is usually given out in short takes, the operator who gets the first take recasts a number of lines after he has determined the drop. Each successive operator receiving a take of the table is then given one of the recast lines so that all will have the same drop. It should be noted here that some papers still use the point system in setting tabular matter. For this method the machines are usually equipped with two point thin spaces, three point nut spaces and five point mut spaces. By combining these various units, the operator can obtain any number of points he wishes to use between columns, and instead of counting a given number of quads and spaces to obtain alignment, he counts in points. A good example of this is the following radio table taken from the "New York Sun".

1:00 WEAF—News, weather report.
WOR—Talk, Greta Palmer.
WJZ—Love and Learn, sketch.
WABC—Morton Bowe, Meri Bell.
WHN—News.
1:15 WEAF—Dan Harding's wife.
WOR—Dr. Arthur F. Payne.
WJZ—Talk, Nellie Revell.
WABC—Pretty Kitty Kelly, sketch.
1:30 WEAF—Charles Sears, vocalist.

When the columns of a table consist of words and figures, or of words only, the table is called a variable column table. If the words in the columns are all different, the table is usually set by placing each column on a separate slug and butting them together. However, if the number of variables in the column is not large, the table may be set on a single slug.

A common example of this is the newspaper weather table. It will be noticed that although there are two columns of variables, there are only a few different words used in

the right hand column. Therefore the newspaper operator would set the longest word or words in the right hand column (in this instance, Pt. Cl'dy) and remove the mats from the assembling elevator. A thin space may be used to separate the words and the mats are laid on a flat surface. Now he sets up any of the shorter words and lays this next to the Pt. Cl'dy group. Using space matrices, the shorter group is built up to equal the longer. This is repeated with each of the variations which appears in the column. As each one is justified to the longer, the operator makes a note of the amount of spaces needed and when finished sets the table on one slug, knowing that the columns will all line up sufficiently well to be acceptable.

Country-Wide Weather Conditions

Station	Temp. High.	Low.	Barom-eter.	Rain-fall.	Weather
Atlantic City.	68	46	30.14	..	Clear
Baltimore ...	74	50	30.14	..	Clear
Boston	68	42	30.04	..	Clear
Buffalo	60	42	30.10	..	Cloudy
Chattanooga .	84	58	30.02	..	Pt. Cl'dy
Chicago	72	46	29.88	..	Cloudy
Cincinnati ..	72	44	30.04	..	Clear
Cleveland ...	60	48	30.06	..	Clear
Dallas	86	66	29.82	..	Cloudy
Denver	74	50	29.78	..	Cloudy
Detroit	68	44	30.04	..	Cloudy
Galveston ...	80	72	29.98	..	Clear
Helena	58	44	29.98	..	Pt. Cl'dy
Minneapolis .	62	56	29.54	.49	Rain
Montreal	66	40	30.00	..	Clear
New Orleans	86	68	30.00	.06	Fog
New York ...	73	44	30.10	..	Clear
Norfolk	66	54	30.20	..	Clear
Okla. City ..	84	62	29.72	.19	Snow
Omaha	80	58	29.58	.09	Cloudy
Philadelphia .	74	48	30.14	..	Clear

Newspaper tables showing the line-up of teams in various sports such as hockey, basketball, football, etc. are set in many different ways, depending on the style used in the paper.

In the following table, if the job is set on one slug, the same procedure as was used in the weather table is followed. That is, the names on each end of the line are justified to each other, using leaders. In order to keep the position in the center, the number of additional leaders and bands dropped on each side must be the same. This of course does not take into consideration the leaders used to equalize the names.

	RANGERS		BOSTON	
1	Henry	Goal.....	Brimsek	1
2	Coulter	Defence.....	Hollett	2
11	Pratt	Defence....	D. Smith	8
7	Watson	Center.....	Schmidt	15
12	Hextall	Wing.....	Bauer	17
9	Patrick	Wing.....	Dumart	14
4	Sibicky	Spare.....	Crawford	6
5	M. Colville....	Spare.....	Wiseman	7

Another method is to set the table on two slugs. With the machine set for half measure, the operator sets the first half of the line, splitting the letters which indicate the position as nearly as possible into two equal groups.

1 Henry	.....Go	al.....	Brimsek	1
2 Coulter	.....Def	ense.....	Hollett	2
11 Pratt	.....Def	ense	D. Smith	8
7 Watson	.....Cen	ter.....	Schmidt	15
12 Hextall	.....Wi	ng.....	Bauer	17
9 Patrick	.....Wi	ng.....	Dumart	14
4 Sibicky	.....Sp	are.....	Crawford	6
5 M. Colville	....Sp	are.....	Wiseman	7

A third method is to set up the center portion of the table leadered out on both sides. This is kept standing and when the copy comes in, the names of the players on one team are set flush left and leadered out, the other team being set flush right and leadered to the left. The slugs are then sawed and joined, the table appearing on three slugs.

	RANGERS		BOSTON	
.....Goal.....	1	Henry.....	.....Brimsek	1
.....Defense.....	2	Coulter.....	.....Hollett	2
.....Defense.....	11	Pratt.....	.....D. Smith	8
.....Center.....	9	Patrick.....	.....Bauer	17
.....Wing.....	7	Watson.....	.....Crawford	6
.....Wing.....	12	Hextall.....	.....Dumart	14
.....Spare.....	4	Sibicky.....	.....Wiseman	7

Still another method is to set the positions flush left and leadered out. This is kept standing and the copy is set flush left and right on a shorter measure to be cut into a two slug table.

		RANGERS	BOSTON	
Goal.....	1	Henry	Brimsek	1
Defense...	2	Coulter	D. Smith	8
Defense...	11	Pratt	Schmidt	15
Center....	9	Patrick	Bauer	17
Wing.....	7	Watson	Crawford	6
Wing.....	12	Hexall	Dumart	14
Spare.....	4	Sibicky	Wiseman	7

Assignment

Useing the methods described in the text, set each of the tables given as illustrations, excepting the radio table.

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TABULAR COMPOSITION—IV

The matter of casting up, or estimating the width of a multi-column table, or the size of face to set it in is not as difficult as it might seem to be at first glance. Suppose that the following copy is to be set and that the preference is for 12 point type, what is the narrowest measure in which it can be set?

	Net Earnings, 1942		
STEEL PRODUCERS	1st quarter	2nd quarter	3rd quarter
Bethlehem Steel Co.....	$8,293,833	$10,022,875	$9,899,560
Republic Steel Corp.....	5,567,063	487,251	3,237,156
Youngstown Sheet & Tube Co.....	4,886,019	2,022,112	3,586,495
National Steel Corp.....	5,695,819	6,013,077	5,227,071
American Rolling Mill Co.....	2,320,917	4,321,854	2,646,525
Inland Steel Co.....	5,008,774	3,178,383	4,433,375
Colorado Fuel & Iron Corp.....	532,283	235,645	442,080
Otis Steel Co.....	702,396	1,040,424	948,285
Wickwire Spencer Steel Co.....	246,726	600,694	230,366
Ludlum Steel Co.....	393,116	506,087	301,994
TOTAL	$33,646,946	$28,428,402	$30,952,907

Checking the drop, we see that the total line will have 5 muts in each column and with a mut allowance between columns, the drop would be approximately 18 picas wide. The longest line in the stub, "Youngstown Sheet & Tube Co." contains 27 characters. Estimating that each character is on a nut body, and allowing for one em leader to follow, the stub would be approximately 13½ picas wide At this rate, the table would be 31½ picas overall. Probably however, by carrying over "Co." on the longest line of the stub, or by thin spacing, and dropping the final leaders on the longest line, we would be able to set the table on one slug, 30 picas wide.

If the same table was to be set to a definite width (say 36 picas) we would add one more mut space before each of the columns and use the balance of the space as leaders in the stub. If the table is narrow and the page wide, it is better to center it than try to spread it out to full measure. However if style or customer's requirements make full measure necessary, it is better to add proportionately more leaders to the stub than to extend the spacing between the columns too far

for easy reading. If on the other hand a wide table must go on a narrow page, the size of the type must be reduced until it will fit the measure. If this cannot be done, it is necessary to run the table lengthwise on the page or across two pages (allow for the inside margins), or to print on a wide sheet and insert.

When a table consists of columns of solid figures and has no stub, equal spacing can be obtained between the columns by opening the vise jaw beyond the measure, and dropping spaces and bands on the left side of the slug as was done in the stagger method of double up composition.

In the previous lesson we had been working on variable column tables set on a single slug. Another example of this is found in financial tables which often have abbreviations of the months in the columns. As in the weather table, each abbreviation may be built up to equal the widest, using hair spaces. The machine manufacturers also can supply these abbreviations as logotypes of uniform widths.

DIVIDENDS ANNOUNCED

Am Can pf	$1.75	Q	Apr. 1	Mar. 17
Am Invest (Ill)	25c	Q	Mar. 1	Feb. 13
Am Stores Ca	25c	..	Mar. 27	Feb. 18
Atlanta G Lt pf	$1.50	A	Apr. 1	Mar. 14
Benuit Mills pf	37c	Q	Mar. 1	Feb. 15
Butler Bros	15c	..	Mar. 1	Feb. 7
Butler Bros pf	37	Q	Mar. 1	Feb. 7
Ca Vinagers	10c	S	Mar. 1	Feb. 15
Ca Wire & Co "A"	$1	Q	Mar. 15	Feb. 28

When a large number of fractions are used, it is usual to run them in the magazine instead of as pi mats. The standard fraction layout is ⅛ in the ffi channel; ¼ in ffl; ⅜ in ?; ⅝ in Z; ¾ in ffb; ⅞ in &. It is advisable to memorize this layout as the keyboard frequently will not be changed over by use of three character key buttons. In fact, it is a good practice whenever you are going to operate an unfamiliar machine to run through the keyboard from x to the em leader, and the last vertical cap row, as these are the keys where the layouts are most frequently changed. This fraction layout is used for setting newspaper stock and bond tables in which the + mark runs pi and the em dash is used for the minus sign.

Another common type of table where two groups of variables are set on a single slug, is the roman numeral variety. The most common use of these tables is in the listing of chapters on a contents page. In this system, capital letters are used for numerals I is 1, V is 5, X is 10, L is 50 and C is 100. A smaller number which follows after a larger number, is added to it. Before a larger number, it is subtracted from it.

Chapter		Page
I	The Big Scheme of Simple Operation	3
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IV	Magazines and Escapements	57
V	Assembler Entrance	79
VI	Spacebands and Spaceband Box	85
VII	Assembler Slide	90
VIII	Assembler Elevator	93
IX	Delivery Slide and Channel	98
X	First Elevator and Vise Automatic	108
XI	The Vice and Justification	123
XII	The Mold, Mold Disk and Mold Slide	133
XIII	Gas and Electric Metal Pot	152
XIV	The Ejector	213
XV	The Knife Block	219
XVI	The Galley and Slug Lever	226
XVII	The Transfer Mechanism	232
XVIII	Single Distributor, Box and Font Distinguisher	250
XIX	Distributor Clutch	264
XX	Tooth Combinations on Bar and Matrices	269
XXI	Driving, Starting and Stopping Mechanism	276
XXII	Cams, Cam Actions and Machine Actions	286
XXIII	Single Distributor Models 27 and 28; 31 and 32	290
XXIV	Multiple Distributor Models 25 and 26	295
XXV	Multiple Distributor Models 29 and 30	310
XXVI	"Two-in-One" Linotypes	320
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XXVIII	The Model 9	354
XXIX	Matrix Bridges and Bridge Notches on Matrices	365
XXX	The 42 Em Linotype	373
XXXI	Adjustments, and How to Take Down a Linotype	382
XXXII	The Linotype Self Quadder	391
XXXIII	General Maintenance	410
XXXIV	Linotype Lubrication	421
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XXXVI	The All Purpose Linotype	445

It is customary to align the roman numerals at the right, followed by a mut space, while the text matter aligns at the left. There are two methods of getting this dual alignment. In

the first method, all the characters necessary to make any combination appearing in the table are run down at the beginning of the line. The number of characters depends on how high the table runs. In the accompanying example it will be seen that no line has more than three Is, one V or three Xs. Therefore, from this run-down (IIIVXXX) we can make any combination of roman numerals appearing in the table. These are run down at the beginning of each line and since we always have the same number of characters, they form a "constant" which is bound to align on both sides. The matrices which do not print are turned backwards in the assembling elevator and do not cast. Since the matrices will not run through the distributor box in this position, it is necessary to stop the machine just after the transfer and remove them from the second elevator bar as was done in a previous tabular job when centering heads over columns. Remove all the roman numeral characters from the bar and replace them in the assembling elevator, making any necessary transpositions before replacing them.

If the text of the table should make more than one line, the carry-over should, of course, be indented at least one em beyond the first line. This indention may be obtained by turning all the roman numerals backwards and adding the extra space desired. If a large number of text lines break over however, it is quicker to find how many spaces the constant makes as was done in setting the weather tables. Dropping this equivalent amount of space before the carry-over line will save stopping the machine to take mats off the second elevator bar.

Safety: Do not place your hand under the descending second elevator. Stop the machine by the control lever, not by holding the elevator.

Assignment

If the last column is omitted, what is the narrowest measure in which the first table in this lesson could be set, using six point type?

Using the method described, set the contents page given as an illustration in this lesson.

School for Machine Typesetting

OF THE NEW YORK SCHOOL OF PRINTING

J. HENRY HOLLOWAY, *Principal* THOMAS J. O'CONNELL, *Instructor*

TABULAR COMPOSITION—V

In the previous lesson we set a contents page by the process of reversing the mats in the assembling elevator. It is noticeable however that the method used is not very satisfactory for two reasons. For one, no line ever comes to full measure since there is always at least one matrice turned backward. Also stopping the machine to take the mats off the second elevator bar takes up much time.

When a roman numeral table runs more than 15 lines, better time can be made by using another method which, while taking longer to get started, does not necessitate any changes of mats by hand. Also this second way will bring the longest group of roman numerals flush to the end of the slug.

1. Our object again is to make the variable groups of roman numerals into a constant by running down at the beginning of each line, all the characters necessary to make any combination appearing in the table. We now take a line gauge and measure this group of characters. If it does not come to full pica or nonpariel measure, we add sufficient space mats to make it do so. We will call this run-down of spaces and numerals "A".

2. The next step is to open the left hand vise jaw, the assembler slide and the line delivery long finger to the measure of the job plus the width of "A". If the job is 24 picas wide and "A" makes 3½ picas we would set the machine for 27½ picas, except the liner and ejector blade which remain at 24 picas. This means that when we send in a line of mats, 3½ picas on the left end of the line (the width of "A" in this particular example) will not cast because it extends beyond the mold opening.

3. It can be seen that if in such a line we were to place additional space mats at the beginning of the line, the roman characters would be pushed to the right so that they would come in front of the mold opening, and cast. The desirable amount of such spaces would be just sufficient to make the longest group of roman numerals appearing in the table come exactly flush on the left end of the slug. It should be noted that in the

accompanying table, the longest group will be either XXVIII or XXXIII, depending on whether the X or the V is the wider.

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To find how many space matrices this consists of, we proceed as was done in the weather table, to obtain a group of space mats equal to the width of the widest group of roman numerals appearing in print in the table. We will call this run-down "B" and the line on which this widest group of numerals appears we will call line "Y".

4. Cast this line "Y" before beginning to set the table.

If the measurement of space has been correct, the numerals on line "Y" will come exactly to the end of the slug. If the face overhangs the body, there are insufficient space matrices in the run-down "A" "B". If the face is indented from the end of the slug, there are too many space matrices in the combined run-down and either of these conditions must be remedied before proceeding with the job.

Summary: This complete run-down is set at the beginning of every line: first the numerals which do not print, then the blank space found necessary in "A" and "B" and then the roman numerals which print. (Steps 1, 2, 3.) In following this procedure no transpositions are made by hand nor are mats taken from the second elevator bar. Consequently greater speed is achieved than in the previous lesson.

Safety: It is important to keep the blank spaces between the printing and the non-printing groups of roman numerals. Failure to do so will cause a cast in the matrices which overhang the liner. This cast will usually cling to the matrices when the mold disk retreats and will prevent these mats from being raised by the distributor box lift. For the same reason, no pi lines should be permitted to cast when the machine is set in this fashion.

A job which is sometimes encountered today in Directory or Credit Ratings may be done in a similar fashion. In these jobs the letters represent code keys which indicate certain information about a firm, such as financial standing, liabilities, lines of products, specialization in manufacturing operations, courses offered, etc.

Code	School	Register
BA	Commercial	214
CF	Needle Trades	75
AD	Chelsea	58
FEC	Food Trades	110
AD	Aviation	632
CB	Murray Hill	320
BFA	Metropolitan	251

It will also be seen that this method might be used for such a table as the Radio Schedule given in a previous lesson. However, in the metropoitan area, the length of the rundown necessary to make all the stations: WJZ, ABC, MCA, HN, OR, etc. would be so large as to make it cumbersome.

Assignment

Using the method described in this lesson, set the two tables given as examples. Set the longest line first and submit it to the instructor before setting the balance of the table. Do not dump the type on these jobs.

How was the following table set on a single slug?

COMPANIA SALITRERA DE TARAPACA Y ANTOFAGASTA REDEMPTIONS

Bond Series	Profits (New Production) £	s.	d.	Proceeds and Profits Stocks £	s.	d.	
B.	13,510	18	1	16,789	14	1	or its equivalent in U. S. $
A.	51,347	3	5	142,933	11	6	
C.	2,122	14	8	2,267	9	3	
D.	3,710	0	0	7,192	9	3	or its equivalent in U. S. $
E.	1,941	1	2	4,013	10	7	
F.	6,521	3	9	18,956	1	4	or its equivalent in U. S. $
G.	6,377	15	2	19,963	18	11	or its equivalent in U. S. $
H.	5,259	0	5	—			or its equivalent in U. S. $
I.	—			—			or its equivalent in U. S. $
J.	841	8	10	10,559	5	2	
K.	707	11	6	—			
L.	1,271	14	6	13,654	0	7	or its equivalent in Chilean Pesos
M.	1,816	15	1	—			or its equivalent in Chilean Pesos
N.	191	4	9	—			
	£95,618	11	4	£236,330	0	8	

SCHOOL FOR MACHINE TYPESETTING

461 Eighth Ave., New York

JOSEPH F. JONES, *Maintenance Instructor*

Maintenance Lesson No. 4-A

MAKING A COMPLETE CHANGE ON A LINOTYPE MODEL 8

In making a complete change on any model machine, we must get the habit of doing each operation in sequence, not every other time we make a change, but every time we make the change. In this manner we train ourselves to do every operation, step by step, until the complete change has been made. We will thereby avoid piing magazines, forgetting to change ejector blades, and above all avoid breaking liners.

When we have no fixed system of doing a job, it is very easy to forget an operation. By forming the habit of doing every operation in sequence correctly it will soon be almost impossible to make mistakes and damage the machine or parts of the machine.

When it is necessary to remove the top magazine on a model 8 machine, have that magazine in operating position. To remove the middle magazine, have the bottom magazine in operating position. To remove the bottom magazine, elevate it until it is above the magazine matrix guard.

In changing from the top to the middle or bottom magazine or vice versa, proceed as follows:

1. Run in pi.
2. When the pi is distributed, raise or lower the desired magazine into position.
3. Set the ejector blade if necessary.
4. Turn the mold disk, placing the desired mold in normal or ejection position.
5. Set the vise jaw.
6. Set the trimming knives.

7. Set the assembler slide, and delivery slide long finger.
8. Assemble a line and check up.

In making the complete change turn on the power, run in any pi that may be found on the keyboard tray, go to the back of the machine, get up on the step, open the channel entrance, lift up the matrix guard to be sure that there are no matrices clogged between the partitions of the channel entrance. Change the magazine and font distinguisher. Whenever it is necessary to make a change we know what the length of the line will be; therefore, change the ejector blade BEFORE changing the mold liners. After changing the liners, always turn the mold past the back knife. If the liners should be damaged or pushed back too far into the mold, we will be able to feel the "bind" on the back knife and be able to rectify the trouble and avoid nicking or dulling the back knife.

1. Turn on the power.
2. Run in any pi that may be found on the keyboard tray.
3. Go to the back of the machine, get up on the step, open the channel entrance and channel entrance matrix guard, to be sure that there are no matrices clogged there.
4. Turn the mold disk, placing the desired mold in normal or ejection position.
5. With your right hand turn the magazine elevating screw crank handle clockwise until you can push down on the automatic matrix guard lever, R. H., with your left hand. Replace the left hand with the right hand on the automatic matrix guard lever, R. H., pull down the magazine frame elevating handle with the left hand "fanning" the magazines.
6. With the right hand unscrew the escapement hook screw nut, R. H., re-

leasing the escapement hook. With the thumb of the right hand push in on the magazine matrix locking strip. Release the L. H. escapement hook with your left hand. Lower the escapement gently.

7. Apply the supporting arms.
8. Raise the lower end of the magazine permitting the magazine to slide down into the supporting arms. Close the magazine matrix locking bar.
9. Carry the magazine to the rack, secure the desired magazine, hang it on the supporting arms and open the magazine matrix cover.
10. Raise the lower end of the magazine pushing the magazine up into position on the magazine frame.
11. Remove the supporting arms.
12. Run the index finger of your left hand along the upper groove in the underside of the magazine from right to left to replace any matrices that may have become dislodged.
13. Clamp the escapement to the magazine.
14. Raise magazine frame elevating handle with your left hand.
15. With your right hand turn the magazine elevating screw crank handle clockwise until the automatic matrix guard lever, R. H., begins to ascend. Push down and up on matrix guard lever with L. H. and turn crank handle counter-clockwise as far as it will go, locking the magazine into position.
16. Unlock or remove the magazine matrix locking strip.
17. Set the font distinguisher.
18. Set the ejector blade if necessary.
19. Change mold liners if necessary.

Note — After changing liners, always turn the mold disk counter-clockwise

into position, so that, should the liners be inserted into the mold too far, or the liners be damaged, you can feel the liners striking the back knife, thus avoiding damage to the back knife and liners.

20. Set vise jaws.
21. Set trimming knives. Be sure to remove the back lash.
22. Set the assembler slide and delivery slide long finger. To check up on ourselves after making the change, assemble and cast a slug, noting the following:

(A) Examine the face of the slug, noting that we have the proper face and that it is printable.

(B) Examine the ends of the slug, noting that there is neither an overhang nor an indention.

(C) Examine the side of the slug to determine whether the trimming knives are trimming.

(D) Examine the bottom of the slug. If the bottom is shiny, it usually indicates that the mouthpiece is cold. Turn up the heat on the mouthpiece and wipe off the mouthpiece. If the bottom is hollow, it usually indicates that the mouthpiece is too hot. Turn down the heat and wipe off the mouthpiece.

It is assumed that the metal in the pot is the proper temperature. The temperature of the metal should be between 535 degrees and 550 degrees F. In the absence of a metal thermometer, a piece of proof paper folded lengthwise and inserted into the metal is a good substitute. If the paper comes out a dark brown, or is burned, the metal is too hot. If hardly colored it is too cold. A light straw color will indicate that the metal is approximately the proper temperature.

SCHOOL FOR MACHINE TYPESETTING
461 Eighth Ave., New York

JOSEPH F. JONES, *Maintenance Instructor*

Maintenance Lesson No. 4-B

MAKING A COMPLETE CHANGE ON THE INTERTYPE

Whenever it is necessary to remove a magazine from an Intertype machine, regardless of the position of the magazine that is to be removed from the machine, the top magazine must be set in operating position.

To change from one magazine to another—without removing a magazine from the machine—proceed as follows:

1. Run in any pi matrices that may be found on the keyboard tray.
2. When the matrices have been distributed, open the channel entrance by pulling down on the channel entrance operating handle. Turn the magazine frame operating lever counter-clockwise to change from the top magazine to the middle or bottom magazine, and clockwise to change from the bottom to the middle or to the top magazine. Close the channel entrance by raising the channel entrance operating handle.
3. Set the font distinguisher.

Note—The latest model C Intertype has a crank handle located near the keyboard. Three revolutions of this handle opens the channel entrance, raises or lowers the magazines and closes the channel entrance, without the operator leaving his seat.

OPERATIONS

1. Turn on the power.
2. Run in any pi matrices that may be found on the keyboard tray.
3. Go to the back of the machine. Get up on the step. Open the channel entrance and channel entrance matrix guard to make sure that there are no matrices clogged there. Leave the channel entrance open.
4. Place one foot on the step. With your left hand tilt the magazine frame cradle latch. With your right hand pull down the magazine frame cradle. Raise the rear end of the magazine to be removed, permitting it to slide down onto your knee. Carry the magazine to the magazine rack. Take the desired magazine and run it up into position on the magazine frame.
5. Stand on the step and raise the magazine frame cradle. Close the channel entrance.
6. Set the font distinguisher by raising or lowering the distributor box font distinguisher indicator lever rod to notch on the font distinguisher indicator plate.

7. Set the ejector blade, if necessary, by pressing down on the ejector locating lever and shift the ejector shifter lever until it registers with the desired measure on the ejector blade em scale. Remove your hand from the ejector locating lever, and make sure that the ejector shifter lever is securely locked into position.

8. Change the mold liners if necessary. Turn the mold disk counter-clockwise until the mold in which the liners are to be removed is in the casting position. Using the mold-cap wrench loosen the mold cap swivel bolt nuts. Push the mold cap swivel bolts away from the mold cap. Reverse the wrench. Remove the mold cap and place it on the pi box. Remove the liners and replace them with the new liners. Return the mold cap and mold cap swivel bolts. Tighten the mold cap swivel bolt nuts. Turn the mold disk counter-clockwise into normal position.

9. Set the vise jaw, L. H., by pulling out and turning the vise adjusting knob clockwise or counter-clockwise to the desired measure.

10. Set the trimming knives. Raise the knife block detent. Turn the knife block to the proper size. Lower the detent into the knife block dial.

11. Set the assembler slide by pressing down on the assembler slide adjusting block detent. Move the assembler slide adjusting block to the desired measure. Set the delivery slide long finger leaving about one pica of

space between the long finger and the assembler slide finger. Assemble and cast a line, noting the following:

(A) Examine the face of the slug noting that you have the proper face and that it is printable.

(B) Examine the ends of the slug noting that there is neither an overhang nor an indention.

(C) Examine the side of the slug to determine whether the trimming knives are trimming.

(D) Examine the bottom of the slug. If the bottom is shiny, it usually indicates that the mouthpiece is cold. Turn up the heat on the mouthpiece and wipe off the mouthpiece. If the bottom is hollow, it is usually an indication that the mouthpiece is too hot. Turn down the heat and wipe off the mouthpiece.

It is assumed that the metal in the pot is the proper temperature. The temperature of the metal should be between 535 degrees and 550 degrees Fahrenheit. In the absence of a metal thermometer, a piece of proof paper folded lengthwise and inserted into the metal is a good substitute. If the paper comes out dark brown or is burned, the metal is too hot. If it is hardly colored it is too cold. A light straw color will indicate that the metal is approximately the proper temperature.

J. HENRY HOLLOWAY, *Principal* JOSEPH F. JONES, *Instructor*

THE SPACEBANDS

EQUIPMENT AND MATERIAL:

Spacebands, pine board, graphite, brass rule, small brush, Linotype or Intertype machine.

THINGS TO KNOW:

Spacebands are two steel wedges. The long wedge is called the "band," the short wedge the "sleeve," which has lugs, or ears. The sleeve is dovetailed and slides in a slot in the "band" or long wedge.

Spacebands must always be put in the machine with the sleeve or short wedge to the right.The reason for this is that the rear or casting edge of the sleeve is about .001″ thicker than the front edge, so as to provide a tight lockup.If the spacebands are turned with the short sleeve to the left, hair lines may appear in the print and the matrix side walls will be ruined.

There are five kinds of Linotype spacebands and they can be individually identified by lines which appear on the lower front edge, as follows: one line, thick; two lines, extra thin; three lines, extra thick; four lines, special taper; five lines, wide range.

EXTRA THIN—minimum .028″, maximum .0943″. The extra thin spaceband should always be used on fine work where close spacing is required for good appearance and easy legibility.

THICK—minimum .0375″, maximum .1035″. The thick spaceband often referred to as "regular," is the type used for normal spacing of medium-sized faces and for ordinary use when close spacing is not required.

EXTRA THICK—minimum .046″, maximum .146″. The extra thick spaceband, known in some shops as the "Jumbo," is used only for the larger display sizes.

WIDE RANGE—minimum .0345″, maximum .1194″. This is a newly developed type of spaceband to give extreme flexibility of spacing. Thin enough for close spacing of small faces and in narrow measure, with ample range of expansion for wide spacing of larger faces.

SPECIAL TAPER—minimum .0369″, maximum .1219″. Similar to the wide range, but half a point thicker all along the line.

The above table shows that a regular (thick) spaceband with the sleeve at the top of the long wedge, measures .0375″. When the sleeve is at the bottom of the long wedge the spaceband measures .1035″. From this it will be observed that the spaceband has an expansive power of justification of .066″ or about four and one-half points.

There are seven thicknesses of Intertype spacebands which correspond in expansive power to the Linotype spacebands of the same thicknesses.

The expansive power of the seven Intertype spacebands is as follows:

BAND	MIN.	MAX.
EXTRA THIN	.028″	.092″
EXTRA THIN	.030″	.0835″
THIN	.032″	.096″
IDEAL THIN	.032″	.1175″
IDEAL	.037″	.1225″
THICK	.0375″	.1015″
EXTRA THICK	.048″	.144″

The condition of the spacebands is very important. A defective spaceband will collect metal quicker than the others and should be removed from the machine until remedied.

For the best results the spacebands should be rubbed on a graphite board every four hours using graphite liberally as it acts as a non-flux, but its chief purpose is to lubricate the wedges, which makes justification easier. Graphite also helps to remove the small oxide stain or metal accumulation on the sleeve at the casting point and provides lubrication for the sliding wedge of the spaceband, so as to reduce friction between the sleeve, the wedge and the matrice.

The oxide or metal accumulating at the casting edge of the sleeve must be removed. First scrape off any type metal that may have adhered at this point. Use a piece of brass rule. Tools made of harder metal should not be used for this purpose as they will injure the face of the sleeve.

THE PLUNGER

The Pot Plunger—commonly known as the "plunger" is made of cast iron and is cylindrical in shape, about two inches in diameter and about two inches in length, with grooves cut about ¼ inch apart. There is a cold rolled steel rod attached to the inside of the plunger by a pin which permits the rod to swing freely.

PLUNGER SHOULD BE CLEANED DAILY

A dirty plunger will cause hollow slugs, chilled face and back squirts, because it cannot make a good forcible down stroke. When the plunger goes down slowly the metal becomes chilled before it reaches the matrices, thereby giving a chilled face that cannot be used in printing.

The plunger should be brushed thoroughly with a wire brush immediately upon its removal from the pot.

Care should be taken not to inhale any of the dust that may arise from the plunger while brushing it.

The plunger should never be placed upon the back-step of the machine, where it can be knocked down and become burred.

About 2 inches below the top of the well of the metal pot crucible are two holes, one opposite the other, called the intake holes. These holes must be kept open and not permitted to become clogged up. These holes permit the metal to flow under the plunger after each cast to replenish the supply in the well after each cast. As the pot rocks forward to make the cast the plunger remains stationary, so that when the mouthpiece is locked against the mold, the plunger covers the metal intake holes. In this way metal cannot escape back into the crucible when the plunger descends. If the plunger is dirty it will also raise as the pot raises and the two intake holes will not be closed, so that when the plunger makes its casting stroke a consederable quantity of the metal will be forced back into the pot through the intake holes and a light slug is likely to be cast.

After cleaning the intake holes in the pot crucible well, the well must be throughly scraped to permit the plunger to descend freely.

Metal in the pot crucible should always be kept above the level of the plunger. When the metal is lower than the top of the plunger in the pot crucible the plunger becomes very dirty, due to exposure to the air.

When returning the plunger into the well do not force it down too far as this will cause metal to be forced out of the hole in the mouthpiece against the back of the mold. The metal thus forced out of the pot prevents the mouthpiece from locking against the mold during the cast and back squirts will follow.

Always return the plunger into the well with the small wires in the plunger rod facing the back of the machine. This wire is a safety latch and permits the plunger to be forced out of the plunger lever when the machine is run while the metal is "frozen," thus preventing damage to the machine..

SCHOOL for MACHINE TYPESETTING

J. HENRY HOLLOWAY, Principal

Compiled by

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TYPE OF MODELS, FEATURES AND CONSTRUCTION OF MACHINES IN THE SCHOOL

The following compilation is briefly described for our apprentices and journeymen to enable them to observe at a glance the various models through their construction. I realize they will be called upon to operate all kinds of model line casting machines in their quest for a livelihood in the printing trade. Therefore, the description of the various features, intricacies, and the range of type to be set on these machines is briefly explained.

In reading over the different descriptions, you will notice I have stated about the single keyboard on the Linotype machines. I will explain briefly, before taking up the separate models to prevent confusion when you are confronted with these various types of auxiliary magazine machines.

You will notice on the linotype machines that some auxiliary magazines are wider than others. This is due to the engineering improvements to cast a wider face of caps, therefore, a wider magazine was necessary to carry these matrices. Nevertheless, all the auxiliary magazines in the school contain 34 operating channels—therefore, we can obtain 34 matrices from these magazines.

The only auxiliary magazines which contain 28 channels are the old style 14, 17, 19 and 22, which have special keyboards placed at the right of the main keyboard. These machines contain two auxiliary keyboards, one overlying the other, the upper one so hinged that it may be instantly swung downward and backward out of the way.

The buttons on the upper keyboard, when in operation, are in contact with those of the lower keyboard, and, through them, operate the escapement mechanism.

The magazines are short and generally carry nine matrices in each channel. The reason for explaining this, although we have none in the school, is to acquaint you with the machine in case you are called upon to operate it in the trade.

After these models came what is known as the new model 14 S. K.—26 S. K., meaning single keyboard. These machines' auxiliary magazines are operated from the main keyboard instead of having a separate keyboard. When the auxiliary keyboard is operated, 34 reeds on the main magazine side are moved toward the rear of the machine by a shift key located at the left of the keyboard, adjacent to the spaceband key. A pointed lug registers with a lever known as a bail. These bails are encased in a metal box known as a "bail box." They balance another lug on the auxiliary reeds corresponding to whatever character is touched on the keyboard and the matrices are carried over to the assembler by a long matrix belt.

As I said before, all the models 14 and 26 manufactured now are single swinging keyboard, wide auxiliary magazine machines. These auxiliary machines will take up from 24 to 36 point full width, and condensed characters up to 60 point. These 34 characters in the auxiliary magazine give a full cap and figure font for use in ads, etc.

NO. 1—MODEL 29—LINOTYPE BLUE STREAK

Model 29 is a multiple distributor or mixer machine. It has an entirely new method of changing from one type face to another. Two magazines are always in operating position. They remain stationary instead of moving. The touch of a finger on a Mixing Key, located at the right of the keyboard, causes the lower assembler front to pivot from one magazine to another, thereby allowing the operator to select matrices instantly and interchangeably. The machine is equipped with two sets of distributor screws, two distributor bars, two distributor boxes, two channel entrances and two stationary front guide holders at the delivery point of the magazines.

The matrices in the distributor are separated by a movable single bridge projection. As the magazines are shifted to bring a different pair into operating position, the single bridge ejector moves with them automatically.

When a change of operating magazines is desired, they are raised or lowered by the new One-Turn-Shift.

This machine is equipped with a four mold disk, a swinging keyboard, a universal ejector and is generally used as a text or job machine. The general range of type faces used on this machine, in the school, is from agate to fourteen point.

NO. 2—MODEL 32—LINOTYPE BLUE STREAK

Model 32 consists of eight magazines—four main and four auxiliary. It contains four molds and casts from agate to 36 point. It is not a mixer machine. It is equipped with a swinging keyboard and a one-turn shift for the magazines Four powerful clock-form springs counterbalance the magazine load. They supply the energy for shifting magazines from one position to another. One crank handle performs the double duty of operating the shifting mechanism for both main and auxiliary magazines. The action of the handle is transmitted either to the main or auxiliary sides by simply moving a shift indicator lever, conveniently located above the crank handle, to either the position marked MAIN or AUX.

It is also equipped to cast the new two-letter matrices 18 and 24 point in size. It is equipped with a double 'flop' for this purpose. When casting the light face character of an 18 or 24 point two-face matrix it is not necessary to use any 'flop'. When casting the bold face of the same matrix it is necessary to use the two 'flops'. This is obtained by a special mold manufactured by the factory. When casting a regular one character matrix from 18 to 36 point it is necessary to use the regular 'flop'. Therefore, the machine is generally used as an advertising or head letter machine. It can also be used as a text machine.

The top magazine is a split and like all magazines on the Blue Streaks in the school is linolight. It is equipped with the em, en, and thin space release.

This attachment automatically releases any one or all of these fixed spaces in combination with or independent of the spaceband when the spaceband lever is touched.

NO. 3 MODEL 26—NEW STYLE

Model 26 is equipped with two main full length magazines and two auxiliary magazines. The top magazine contains 72 channels. This machine is known as the 72-90 mixer machine. It has two distributor boxes, the top box accommodating the distribution of the matrices to the bottom magazine and the bottom or secondary box accommodating the distribution of matrices to the top magazine. This is a mixer or multiple distributor machine having two controlling key buttons for power shifting the magazines. These power shift buttons are conveniently located at the right of the keyboard—one for the main and one for the auxiliary magazines.

The top main 72 channel magazine is not interchangeable with the bottom main magazine because it has a 72 channel escapement and will not accommodate a 91 channel magazine.

It is also equipped with the en, em and thin space attachment similar to the 29 and 32 models; and has the special two mold equipment similar to the model 32. It is also equipped with the universal self-quadder and centering device.

An added feature is the spreading device to spread three pica ems providing there is enough spacebands to properly justify the line.

The casting range of this machine is from agate to 36 point full face. It has a swinging keyboard which swings out as a single unit.

It is equipped with four molds, universal knife block, double 'ee' attachment and can be used as text, job, newspaper, advertising or head-letter composing machine.

Blank slugs can be cast with the spreader lever in any hole and quadding lever out, and set at center, quad left or quad right. Blank slugs cannot be cast in regular position, that is, when quadding lever is pushed in and the quadding is REG. position.

NO. 4—(4-4) INTERTYPE MIXER

Intertype Mixer (4-4) consists of four main full length magazines and four auxiliary magazines. The top and second magazines mix as a pair, the third and fourth magazines on both the main and the auxiliary mix as pairs.

Number one and three on the main magazine are 72 channel magazines and two and four are 91 channel magazines. The magazines are removed from the front of the machine.

Two keyboards are installed on this machine, one for the main magazine, the other for the auxiliary magazine. It also has two sets of reeds which are easily shifted by the operator for the various type faces in the magazines.

Some added features are: it is equipped with six molds and is easily changed by the operator. The ejector is automatically controlled and is changed from one measure to another, when the operator pushes in on the mold disk control lever. The machine is equipped with a special two-letter 18 and 24 point attachment. This feature allows the setting and casting of either a light or bold face of 18 or 24 point. The regular large faces of one character matrices from 18 to 36 can also be cast on this machine. It is equipped with a self centering and quadding attachment.

A special feature of this machine is a fixed indention attachment which permits the indention of even em indention on the left or right of the slug. This is automatically controlled by the operation of a lever on the left side of the vise cap and eliminates the dropping of quads at the beginning or end of the line.

NO. 5, 7, AND 11 ARE MODEL 8—LINOTYPES

These machines are converted into a one magazine machine for text compositions, being four mold disk machines and cast from agate to 14 point. They are equipped with the universal ejector and can be adjusted from 4 to 30 pica ems in width.

NO. 6—MODEL 14 B. S. K.—LINOTYPE

This machine has six magazines, three main full length and three auxiliary magazines. It contains two regular U. A. molds and two Head-Letter molds and casts from agate to 36 point in lengths from 4 pica ems to 30 pica ems.

It is equipped with a swinging keyboard, and is not a mixer.

NO. 8—MODEL 14 S. K.—LINOTYPE

This machine contains three main and one auxiliary maga-

zine, and has four molds which cast from agate to 36 point. It is not a mixer and has a stationary single keyboard. The auxiliary magazine is narrow but contains 34 channels the same as other wide auxiliaries in the school.

NO. 9—MODEL C—INTERTYPE

This machine is a new style Model C, quick change, three magazine machine. The operator turns a handle on the right and the channel entrance automatically opens. He then seats the magazine he wishes to operate from, the channel entrance closes, and the distributor starts automatically.

Model C magazines are removed from this machine the same as on No. 12 machine. They are removed from the back of the machine after the top magazine is brought to operating position.

Model C has many features which eliminate timewasting. The machine contains a hinged first elevator head or jaws which accommodate a special stick attachment for setting large faces of type.

This stick attachment provides for casting hand-set lines in all sizes of type up to and including full-width 60 point caps.

By pulling the special operating lever out (with regular control handle out) the first elevator descends to casting position and returns to normal position without rising to transfer position. This action takes place with the aid of a special first elevator small cam, permitting the machine to make a complete function.

It is also equipped with an automatic quadding and centering device. To center a word, or a line, or even a single character, the operator simply moves a control lever to center position. The matrices are then cast automatically in the center of the line without the use of spacebands or quads. This also applies to setting lines on the right or left of the slug. The control knob is shifted accordingly for lines in these positions.

The casting unit insofar as the quadding and centering is concerned is similar to No. 4 machine. The only difference is No. 9 is a four mold disk casting up to 48 point with the stick attachment and No. 4 casts up to 36 point on 6 molds.

NO. 10—MODEL 26—OLD STYLE LINOTYPE

Model 26 contains four magazines, two main and two auxiliary. It is a multiple distributor machine containing two boxes the same as No. 3 machine. It is similar to No. 3 only the two magazines are full length 91 channels. The auxiliary magazines are like No. 8 machine. This machine casts from agate to 36 point, being equipped with four molds, two of which are Head-Letter. It contains a single keyboard but does not swing out of position.

NO.12—MODEL C—INTERTYPE

This machine contains three full length 91 channel magazines which are removed from the back when changing from one position to another. In order to change from one position to another using the magazines on the machine follow the operations described here:

Throw channel entrance back. Turn magazine cradle "crank" until magazine to be used is in operating position. In order to remove any one of the three magazines for replacing another type face you must have the top magazine in operating position. Always close the channel entrance after the magazine to be used is in operating position.

It is equipped with a four pocket mold disk and can accommodate any mold from agate to 36 point. We generally run this machine up to 14 point. It contains one distributor box, a font distinguisher, and is not a mixer. Therefore it is generally used as a text machine.

A. P. L. — ALL-PURPOSE LINOTYPE

The All-Purpose Linotype (A. P. L.) is a complete unit for casting of type in the form of slugs, in faces ranging from 5 point to 144 point; the casting of furniture, rules, borders, decorative and spacing material from 6 point to 72 point body and up to 42 picas in length. This machine will cast not only regular A. P. L. matrices but also standard Linotype matrices and other hand set matrices.

A compositor sets lines of matrices by hand in special sticks and the machine casts and delivers a finished slug ready for use. The machine has many and varied uses to which a skilled printer can operate to great advantage.

Matrices of the A. P. L. are made in sizes from 5 point to 144 point inclusive. These type faces are divided into two classifications, namely, High Alignment and Low Alignment. Type families having long descenders are in the high aligning classification while other series having short descenders are in the low aligning classification.

Special sticks are provided for the A. P. L. according to the type of matrices to be used. Molds are made to cast the standard furniture height of .765 in sizes 6 to 18 point, 20 to 24 point, 30 point, 36 point, 42 point, 48 point, 60 point and 72 point.

A. P. L. is equipped with a Slug Face Surfacer built on the principle of a high-speed rotary cutter permitting the trimming of the base and face at the same time, thus insuring uniform height to paper.

A slug saw trimmer is attached to the table of the machine and is completely equipped with the latest approved safety devices, guards and attachments for both straight and angle cutting and trimming. The operations of the aligning dial for the purpose of controlled alignment is unique and indicates the versatility of this casting machine.

Mechanical construction of the A. P. L., insofar as the casting unit is concerned, is almost similar to the regular Linotype. The machine actions are similar with the exception of certain mechanical constructions.

It contains some of the same operating functions as the regular machine. These are as follows:

The general design of the ten cams are similar, only the contours have been changed.

A. P. L. machines contain the elevator slide, vise-automatic, mold disk, ejector cam, pot pump, and the driving clutch, which have the same mechanical functions as a regular Linotype machine.

A feature of this casting unit is the working range and various uses which it has in the field of type composition.

The name All-Purpose Linotype was derived because it will serve the printer in all purposes and can be used in newspaper, magazine, commercial, trade composition and advertising typographers' composing rooms.

Printed in the School

Linotype and Intertype

MACHINE MAINTENANCE

How To Check Adjustments
On Line Casting Machines

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HOW TO CHECK ADJUSTMENTS ON LINE CASTING MACHINES

SAFETY PRECAUTIONS

In removing screws and wiring pins, in the process of dismantling a Linotype machine, always return them to their proper places so they can be found when reassembling the machine.

After the machine is assembled you should follow a sequence of operations to check the adjustments and make necessary repairs. Do not operate any machine after it is assembled until all adjustments are checked.

MOLD SLIDE AND DISK

Bring the machine to casting position just before the mold slide advances forward. Remove ejector link and unlock mold cam lever. Insert a set of 5-point liners—30-ems long in the mold. This is done while the knife block is off the machine. Bring the mold slide forward onto the mold disk locking stud blocks. Bring the ejector blades inside the mold by hand. Set the ejector for 30 ems. Insert a .004" steel feeler on both sides of the ejector blades. There must be a clearance on each side of the blade while in this position. The reason for this is to guarantee the ejection of a 5-point as well as a 36-point slug without the blades hitting the edge of the back of the mold.

If the blade is clear on this one mold—push the slide off the locking stud and try each pocket alternately. It is not necessary to try all molds with the 5-point liner. Nevertheless all mold pockets of the disk should come onto the stud blocks without a knock and should push off without the feel of a drop.

The reason for this adjustment is to have a uniformity of trim. A worn or elongated locking stud block will not give the same trim at all times, due to the mold disk not coming on the pins in the same position each time.

Next we will test our up and down stroke of the first elevator. This is for the matrices' alignment with the mold grooves. Open up the vise jaws to 30 ems—insert two new matrices on the extreme ends of the jaws. Bring mold slide forward on studs until matrices' lugs are in the groove of the mold. Hold first elevator up by hand and try to shake matrices with a small screw-driver. If set properly matrices will not move. Adjust front screw on first elevator slide until there is a play of 1/64" between the slugs of the matrices and the groove of the mold. The next adjustment is known as the .010" shake.

Every mold slide should have two forward movements before casting takes place. Inside of the mold cam gear are assembled two hardened shoes. To make this adjustment lock mold cam lever—bring machine in position that the roller on the mold

cam lever is in the center of the first hardened shoe. This shoe is .010" smaller than the second shoe. The adjustment for the .010" shake is made on the mold cam roll eccentric pin. When the roll is on the small shoe go to the front of the machine and move the slide back and forth to see if you have the proper play. This adjustment is essential for if it is not properly made you may ruin a font of matrices, cause squirts and damage the machine.

SETTING THE BACK KNIFE

Before setting the back knife be sure all mold pockets are clean and molds seated properly. Pull mold slide forward to have access for making adjustments. Knife should be set square on the casting and press lightly against the mold. Put red lead on the back of the mold and regulate the adjusting screws until the knife just cleans off the lead on cap and body rib of the mold. Then lock clamping screws securely. Knife should trim all four molds evenly unless they are warped or disk is sprung The back knife controls type high and should be set to .918".

SETTING THE SQUARE PINION

The square pinion has two hardened plates assembled to its casting which guides the steel shoes that hold the mold disk in position to slide freely on the disk bushings at casting and ejection position. The three steel shoes (two of which are operative) on the mold turning cam should be adjusted to allow about .002" clearance between the square pinion and the shoes. These are adjusted by a set of screw bushings adjusting screws on the mold turning cam.

If there is too much play between the steel shoes and the square pinion the mold disk studs will come on the blocks "with a bang" and have a tendency to wear out the bushings on the blocks.

FIRST ELEVATOR SLIDE, JAWS AND CONNECTING LINK

The first elevator slide is adjusted by four gibs mounted on the vise frame. These gibs should be adjusted to allow only .005" clearance between the first elevator jaw and the line delivery channel and the intermediate channel plate. If the distance is greater a thin matrix is liable to fall between these places and cause trouble to the machine. The back and front jaw rails should register with the grooves in the delivery channel.

The following procedure should be adhered to in making these adjustments.

Remove the first elevator link and adjust the upper eyebolt until the space between the top of the link casing and the bottom of the hole in the bolt measures 3/4". Adjust the lower eyebolt

until the space between the lower edge of the link bushing and the top of the hole measures 13/16". On the Intertype it is measured from the top of the casing to the lower edge of the hole 7/8" and from the lower edge of the link bushing to the top of the hole 5/8".

Assemble to slide and first elevator lever and bring to normal position. Adjust first elevator auxiliary lever (if necessary) to bring jaws and line delivery plate grooves at approximately the same height. If slide has to be adjusted a little either up or down move spring tongue accordingly.

Back and front jaw of first elevator should have no more than .005" between the jaws and the matrices. Test with matrix and squeeze jaws together until this position or clearance is obtained.

VISE AUTOMATIC

The vise automatic is a safety device applied to the machine to stop its function if for any reason the first elevator does not go down all the way to present the line in the grooves of the mold. The first elevator must seat itself on the vise cap or the vise automatic stops the machine and prevents accidents both to the matrices and the operator. The two most important adjustments on the Linotype and the Intertype machine (in my opinion) are the vise automatic and the pump stop safety.

To test the vise automatic place a thin space matrix on the vise cap directly under the downstroke adjusting screw of the first elevator slide. If properly adjusted the vise automatic will function and throw the machine out of action.

To set vise automatic, loosen front screw on the first elevator and allow machine to bring elevator on vise cap. Machine will shut off because disk dog is pushing against vise automatic rod and throwing starting lever out of action. Hold first elevator down and turn down on front screw. Handle must be in operating position. When pawl in stop rod is pushed clear of disk dog machine will start. Shut off control lever and tighten lock nut. (This adjustment is always made with plunger pin removed.) Then test as above with thin matrix. Also test with first elevator slide filling piece (flopper).

LINE DELIVERY CARRIAGE

Shut off power, open vise and allow carriage to come across to stop screw on face plate. Measure with 6" scale from the side of delivery channel to short finger of line delivery. This measure should be 13/32". Adjust with screw on end of face plate. This adjustment is to carry the line of matrices and spacebands inside of the first elevator jaws' retaining springs, which keep them from falling off.

The machine should automatically start when a line is sent in. This is known as the automatic "kick-off". To set this, allow

delivery carriage to come inside of jaws. Hold delivery carriage and allow it to come across slowly. When the inside or left of the short finger is even with the under cut of the first elevator jaws machine should start to operate. This adjustment is made on the plate of the safety pawl on the line delivery back of the machine.

A good method to remember this adjustment is to follow a system—when early go in on screw of pawl—when late come out. Lock nut when adjustment is properly made.

The short finger should go to the extreme right back of the second notch of the pawl. A safety spring is connected with the line delivery lever and slide behind the face plate. This is to snap off in case of accident and prevent the slide from operating. If this link does not snap another safety is provided in the split lever at the rear of the machine. This lever prevents breakage by slipping around the shaft. When this lever slips the factory adjustment of the line delivery must be reset.

To make the line delivery setting follow this method: Remove plunger pin, bring machine to casting position and shut off power. Bring the line delivery cam to its highest position against the roll on the line delivery shaft. Then loosen the two screws in the split lever; back off cam to low part, pull up lever by hand, and tighten screws. Bring cam to highest point against the lever roll, go to front of machine and see if distance between the short finger and spaceband box chute is about .008" or the thickness of a business card. A few trials will enable you to make this adjustment correctly.

The delivery slide should not return too far to bear against the spaceband box chute. The delivery lever link should snap off if any accident occurs in delivery of line. To test this adjustment: Run power, allow delivery slide to go across, then hold a slug against channel plate, preventing slide's return. Link should snap. If it does *not* snap off, remove link from lever and lubricate with grease.

Never use oil on the line delivery carriage. Clean with benzine and lubricate with graphite.

Make all adjustments with plunger pin out.

SETTING THE TRANSFER

Many fonts of matrices are ruined due to the fact that the alignment of the transfer is not adjusted properly. I will endeavor to bring in several adjustments here which some authorities consider belong to other parts of the machine.

The first and second elevator should be in perfect alignment to insure proper transfer of the matrices.

Lock the spaceband pawl; allow machine to come to transfer position. Shut off control lever; remove the first elevator top

guide. The transfer slide finger should measure 5⅝" from the right side to the intermediate or transfer channel This is in order to allow clearance for a full 30-em line to transfer without bending the finger

If this adjustment is off you have to loosen the nuts in the split transfer shaft. Move finger to this measurement and tighten nuts. Spaceband pawl should go beyond lock about 1/32". Adjust with turnbuckle inside of column.

Allow second elevator to rest on intermetiate channel Adjust the connecting bolt in second elevator until roller is free of the cam.

Put a new pi mat on first elevator and use a drop light over the spaceband box so as to allow you vision to look through the channels.

The matrix should pass freely from the first elevator to the second. A screw and lock nut on the bottom of the first elevator will allow you to adjust for proper alignment.

When the matrix is passed from the first to the second elevator there must be light showing on both sides of the matrix and around all the teeth.

If light does not show, the intermediate channel plate must then be adjusted.

Next set the elevator transfer slide. The inside cut of the slide finger should align with the edge of the first elevator jaw. This is adjusted by a screw in the automatic pawl in the rear of the machine. This allows the last matrix of each line to transfer on the second elevator.

The slide finger and spaceband pawl should have ⅛" clearance in order to push spacebands under pawl for them to be returned to the box. This is adjusted by a set screw in transfer slide.

Assemble first elevator slide guide to transfer. Put a piece of thin tissue between the intermediate bar plates and the first elevator and see if you can pull them free. Try your pi matrix after the top guide is assembled and see if you still have clearance. If not, loosen large bolts in casting and bring the center bar in parallel line with the second elevator bar. Put a 30-em slug on the first elevator jaws, bring the jaws up by hand and set intermediate bar parallel. After squaring bar, adjust for height by two screws in top cap until the bar pawl is flush (when held up by hand) with second elevator. This pawl is to push the spacebands down when transferring.

When the machine is in transfer position lock the spaceband pawl and adjust the screw in the second elevator 1/32". This adjustment is to prevent the matrices and spacebands from transferring if the second elevator does not come down in position.

ASSEMBLER—ASSEMBLING ELEVATOR—ASSEMBLER SLIDE

To set the assembler slide properly use a 30-em slug between the highest point of the assembler star and the assembler slide finger. Put the full surface against the finger and the notch cut against the star wheel. Adjust the screw in the assembler slide clamp and tighten lock nut.

Raise the assembling elevator (at same time hold back line delivery with left hand) until the latch catches on the stop bar. Adjust delivery slide, releasing wire until line delivery releases from behind the pawl. The assembling elevator should return of its own weight and rebound slightly. This is controlled by a counter balance spring under the keyboard.

When the assembling elevator latch is caught on the stop bar there should be a play of .005" between the back rail of assembling elevator and the stop pin. The assembler slide should return to its operating position just as the line delivery is being released.

This adjustment is made on the assembler brake lever. The assembler chute spring should be adjusted to permit the passage of a cap W of the font you are using.

Open the assembler gate and try the distance between the front and back plate with a large matrix. There should be very little play to enable the matrices and spacebands to assemble properly.

The star wheel should slip on a tight line. Test by holding finger against star wheel and note the tension. There is a catch spring on the back plate of the assembler. This is to prevent matrices from falling backwards. This spring should be flush with the casting when being pushed by matrices in the assembling of the line.

All worn parts of the assembler and assembling elevator should be replaced or repaired to prevent unnecessary transpositions. The pawls, chute spring, fiber buffer strips, assembling elevator gate, spring roll, studs and all working parts of the assembling mechanism should be inspected regularly.

Never use oil on assembler slide or assembling elevator. Clean with benzine or gasoline and lubricate with graphite.

DISTRIBUTOR—DISTRIBUTOR BOX—CHANNEL ENTRANCE

The second elevator should be in perfect alignment with the distributor box bar to allow the matrices to pass freely from the second elevator to the distributor box. The matrices are pushed through the box by the distributor shifter. They travel through the box until the first matrix in the line strikes the inside of the box rails and then are raised up on the screws by

the box lift. The distributor screws carry them along until the matrices reach the proper combination on the bar and then drop off with their own weight into their respective channels of the entrance into the magazine.

The distributor box rails should be parallel across, or in other words of the same height. There should be clearance between the rails and screws. Test the front rail with a piece of paper. Insert the paper between the front rail and the front upper distributor screw. If the rail is binding remove the box and bend the rail slightly for clearance.

To set the distributor box lift, remove distributor belt, turn distributor by hand until distributor cam is at its lowest point against lift cam roll. Adjust screw in lift cam lever, until matrices are raised 1/32" above box rail. To test this again bring cam on lowest point and hold pi mat down with screw-driver and see if there is a 1/32" play under lift and bottom of matrix.

Then turn distributor by hand until matrix is carried across the horizontal top part of the rails. Matrix should be 1/32" above this part. Bring matrix out of box on screw and then turn distributor back slowly and see if matrix enters rails freely without twisting.

If matrix turns on this test then the rails are too high. Tap them down slightly and test with a small square for parallelism.

The distributor box lift should raise only one matrix at a time. If it raises two matrices then the bar point or the lift seat should be checked. Test lip or seat by using a thin space mat. If lip extends beyond matrix—grind off to proper size. Bar point should measure .031" from vertical face of rails to bar point end. If this is too wide—peen bar point until a 5½-point thin space just raises onto rails. Distributor cams left cam lever roll and distributor box rails should be checked and repaired regularly to prevent damage to matrices and screws.

DISTRIBUTOR

The distributor beam and screws assembled are held on to the distributor bracket by two large hexagon screws.

The distributor is set by moving an adjusting screw on the extreme right of the beam.

To set the distributor for height and position follow this procedure:

Run two thin mats across the distributor, allowing for one to go the extreme length without dropping into pi chute. In other words keep one pi matrix over the first channel and one over the last channel.

Loosen large bolts in distributor beam and adjust the height by two screws on top of the beam. Test for height with a scale

or thickness gauge of 1/32". This is known as a 1/32" drop and must be parallel on both ends of distributor.

To set sideways—use lowercase "t" matrix and shift distributor or use adjusting screw on right end until the "t" matrix falls on the top of the third partition. This is done by turning distributor by hand slowly. When the distributor is turning by power the matrix will drop in the center of the channel.

CHANNEL ENTRANCE

There should be no side play in the channel entrance. The channel entrance should line up with the magazine plate. If set too low the lower lug of the matrices will hit the magazine and become damaged. The partition should be bent to allow the matrices to slide freely without interference into the magazine.

There should be a clearance of 1/32" between the magazine and the casting where the channel entrance is assembled. This adjustment is made by two screws and lock nut on the channel entrance frame. Be sure the magazine is seated properly on the flat or finished surface of the magazine frame to allow matrices to pass freely from the channel entrance into their respective channels.

SPACEBAND BOXES

There is no limit to the source of trouble a spaceband box can give if not properly adjusted. The first consideration should be given to having the same size bands in the set being used.

Polish the spaceband pawls and be sure they are the same length. If one pawl is shorter than the other, stone off at the bevel at the top. To test for height use a steel rod in the hole in the pawl. Never stone the vertical edge. The pawl points should be even with the back surface of the spaceband box rails to allow one band to lift at a time. Set the centerbar to accomodate the proper thickness of the spacebands being used.

To make the spaceband pawl adjustment, shut off motor. turn rubber roller shaft by hand until the spaceband box pawl levers are at their lowest stroke, then notice whether there is a play of 1/64" between the slot in the spaceband key-lever adjusting screw and the top of the spaceband key lever. Also see if pawl points are 1/32" below the top edge of the top rails. When the pawl box levers are at their highest stroke the key lever should press against the top of the slot in the adjusting screw and there should be no play above the pawl spring.

This adjusment is made by raising or lowering the key-lever adjusting screw. If it cannot be obtained this way it will be necessary to remove the key lever and bend until the proper dimension is obtained.

INTERTYPE SPACEBAND BOX

The releasing of spacebands into the assembler of an Intertype box varies mechanically from the Linotype. The action of the key lever is to press into a hook pawl in the rear of the box which in turn pulls back a small plunger, allowing the bands to bank against a stop pin. Then as the lever makes its upward stroke the plunger allows one band to drop into the assembler.

The adjustment for allowing bands to pass the pin is made in a movable plate on the front of the box. The proper method of making this adjustment follows:

Depress the spaceband key bar, turn rubber roll by hand and when the spaceband keyrod is at its highest point or stroke set the plate so that it will cover one-half of the second spaceband in the box.

Spaceband boxes should be removed occasionally and washed with benzine and polished with graphite.

ASSEMBLER FRONT GUIDES, KEYRODS AND ESCAPEMENT LEVERS

The assembler front guides should be adjusted to allow a thick mat to drop onto the matrix delivery belt as well as a thin one. There should be no interference at the top of the guide to prevent the matrices from releasing from the magazine. These guides can be shifted bodily with the brass front or bent slightly with a pair of duck-bill pliers.

The escapement levers should come directly under the verge pawl plungers. There is clearance enough in the escapement lever bracket holes to shift either to left or right. The escapement levers should be free enough in the front guide bracket upper to drop of their own weight.

The seat of the escapement levers should be directly over the keyrods to insure proper raising position of the escapement levers. There should be clearance between the cam yoke and the keyboard plunger. More or less tension on the yoke plunger is obtained by adjusting a screw bushing over a spring mounted in the keyboard frame.

TRIMMING KNIVES

These knives are used to trim the slugs to size and parallel. The left hand knife trims the overhang from the smooth side of the slug. The right trims the ribs to size and parallel.

Use the Linotype point when adjusting the trimming knives. A 10-point slug when trimmed correctly should measure .140" because the Linotype point being .014" times 10 point the size of liners being used. After having the knives adjusted to trim one size slug, the knife block is constructed so as to trim all

others. When changing the Universal Knife be sure that one of the lever detent pins has entered the hole.

The Universal Knife Block is adjusted in the following manner: Insert two 30-em 12-point liners in the mold. Assemble a full line of matrices and spacebands, dropping a Cap H on each end of the line. Lock the spaceband pawl and use the same line until the trim is completely finished. Commence with the left hand knife and adjust it so it will lightly scrape the smooth side of the slug. This is to remove all fins which may occur on this side. This knife which trims the overhang on the smooth side of the slug is held to the vise by two square headed screws that pass through the front. These screws are loosened each time the left hand knife is being adjusted. After a slight trim is showing on both ends of the smooth side of the slug, tighten square headed screws securely.

Then insert a 12-point slug between the knives and bring sizing knife up to the ribs of the slug for an approximate setting.

Cast a number of slugs and use micrometer to check for size. The screws that hold the knives should be loose when moving the adjusting screws; if not, there is a danger of springing the knives.

After the trim is made on this one 30-em 12-point mold, test the other mold the same way to see if the trim is uniform. If not, change the mold around and prove whether it is the liners, molds or knives that are at fault. Then test knives on a 12-em 6-point line. This should trim parallel and to size as well as the large slug.

Always check this measure with more than one slug. Bunch about six slugs of this size and micrometer them. The reason for this is that a small slug does not show a variation in parallelism until the slugs are piled up on a full galley

THE VISE JAWS AND PUMP STOP

The vise jaws are adjusted to have the face of the type .010" from each end of the slug. When the line is justified, the matrix on the right end is forced against the face of the short jaw. The matrix on the left is forced against the face of the long jaw. The short jaw is regulated by the adjusting screw in the knife block. The long jaw is adjusted with adjusting bushing which screws in the vise, closing bracket. When setting double column it is necessary for the type to be flush on both ends to prevent trouble in locking up and causing a "river of white."

PUMP STOP

The pump stop is set to have 1/32" between stop lever and catch block when line is properly justified. This is made with screw on operating lever. This is to prevent pump

lever from operating if the line is not properly justified. When the line is justified the short jaw is moved to the right against the adjusting screw in the operating lever, which causes the stop lever to be moved from under the catch block, which allows the pump lever to operate. If the line is not justified, the short jaw not touching the adjusting screws allows the stop lever to remain under the catch block and prevents the pump lever from operating.

To make this adjustment force the short jaw to the right as far as it will go with the left hand. With the right adjust screw so the stop lever will go 1/32" to the rear of the catch lever.

When the line is justified the pump stop operating lever, which is forced to the right by the short jaw, should have a slight lost motion; if not, the position of the type on the right end of the slug would be regulated by the adjusting screw in the pump stop operating lever and not by the adjusting screw in the knife block. The object of this is mainly a safety device to prevent a "squirt of metal" into a loose line of matrices and also to prevent physical harm to the operator.

KNIFE WIPER

The knife wiper is a device for wiping off the small shavings that sometimes stick on the edge of the knife. The action of the wiper is controlled by the downward and upward movement of the first elevator slide. There are two types of wipers used in Linotype. The old style ("brass flag") wipes first in an upward stroke and then in a downward. The new type operates from a spring tension and rod on the outside of the first elevator slide and operates opposite the old type.

It is essential to leave the brass wiper adjusted closely to the knives to prevent fins. A machine that has a wiper not properly adjusted will retard the proper ejection of the slugs. In case of a wiper lever not dropping to normal position the brass wiper will break off and a new one must be applied.

POT LOCKUP

Assemble a 30-em line of matrices and spacebands and allow first elevator to descend to casting position. Shut off machine before mold slide studs advance on vise blocks. Remove plunger pin, unlock mold cam lever, open vise and pull mold slide forward. Cover back of mold with red lead and pull mold slide on stud blocks, lock mold cam lever and go to back of machine, turn clutch until the mouthpiece is forced against the back of the mold. This will leave an impression on the mouthpiece and you can see if a smooth, even bearing is obtained.

The red lead must show clearly across the whole mouthpiece. If it shows only on one end then you have to adjust

the pot with the front and back screws on the legs until the mouthpiece is squarely against the mold. After doing this the mouthpiece should show lead on each end and not in the center, or the reverse, then it is necessary to file or stone the face of the mouthpiece so it will lock up tight against the mold.

Care should be taken in adjusting pot leg screws to be sure that there is no bind on the pot lever shoe and the mold cam gear. There should be clearance and light must be shown between the cam and the shoe on the pot lever.

The 30 mouthpiece holes should align with the lower part or the smooth side of the slug. This adjustment is made with the top and bottom screws in pot legs. A good lock-up is absolutely essential to the efficiency of the machine. A poor lock-up causes back squirts and loss of time and possible damage to matrices, spacebands and machine.

FINAL TESTING METHODS

A final test is necessary after all these adjustments are finished. Tighten all screws and lock nuts. Oil all bearings and rollers, especially cam rollers.

Remove plunger pin, turn on power and place a small screwdriver between the controlling lever and base of machine. This will allow the machine to run continually. Watch all rollers and see that they are working freely. A hesitant roller will become flat and wear a ridge in the cam.

Check the pot lever eyebolt to see if it is adjusted properly. Too little attention is paid to this adjustment. Improper adjustment of the eyebolt may cause broken vise studs. If the spring is not adjusted properly or becomes weak the matrices will not align and the letters on the slug will not be parallel, causing them to print like wrong fonts.

The pot lever eyebolt should be adjusted so that the front nut is 5/32" from the sleeve, and the back nut, so there will be a space of 1/16" to 1/8" between it and the lever when the pot is forward in lock-up position. Or to be more specific, with the end of the rear nut against the pipe on the bolt, have 1/16" from the back of the pipe lever to the head of the nut when machine is in casting position.

Circulate the matrices, running across and up and down the keyboard. Do not use bands in this test and remove plunger pin. Matrices should respond freely and drop off the distributor without clogging the entrance and stopping the distributor.

The machine is now thoroughly tested and should be turned over to the instructor for use in operating.

MEMORANDUM

Linotype and Intertype

MACHINE STOPS

Causes and Remedies

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LOCATING MACHINE STOPS

Suggestions for the Quick Location and Causes of a Machine Stop

When the machine stops for any reason, the operator should push in on the control lever and check the following:

a—The Scales, to see that the measure is set properly.
b—Mold Cam Lever, to see that it is in proper position.
c—Vise Automatic, to see that it is not obstructed.
d—Ejector Pawl, to see that it is not jammed against the lug.
e—Mold Disk, to detect back squirts.
f—Elevators, to see that both are at transfer point together.
g—Stop and Safety Pawls, to see that they are not obstructed.
h—Clutch, to see that it is not slipping.
i—Ejector Lever Link, to see that it is hooked up.

HOW THE MACHINE CAN BE STOPPED

1—Machine can be stopped by pushing in on the Control Lever.
2—Machine can be stopped by Vise Automatic due to tight lines or some other obstruction at this point. This automatic works directly to the forked lever, the same as the control lever functions—the difference being that the control lever operates the lower link and the vise automatic works the upper link.
3—Machine can be stopped at the transfer point by the Safety Pawl pressing on the Vertical Lever. (This is automatic.)
4—Machine can be stopped by anything that will obstruct

its movements, in which case the stoppage will be caused by the Clutch slipping, The leathers on the Clutch should be kept clean to prevent Clutch slipping. (Use gasoline on a rag on the pulley surface.)

RETIMING DISK AFTER BACK SQUIRT

Should the disk be pulled out after the cast to remove a back squirt, and the position of the machine is uncertain, replace as follows:

a—Pull out disk so that it will be even with face of the pinion wheel.
b—Leave mold cam lever disconnected.
c—Raise and tie up the ejector pawl on the lever.
d—Pull out hand wheel and hold it until machine comes to normal. Then retime disk by matching punch marks on disk and pinion wheel and verify by pulling out studs.

NOTE—The student should familiarize himself with the first elevator cam diagram, in such a manner that by looking at the position of the first elevator cam lever roller, when a "hang-up" occurs, he can tell the position of machine and in many cases, the cause of trouble.

MACHINE STOPS

NO. 1—NORMAL POSITION

This position is attained every time the machine makes one complete revolution and stops.
At this point the stopping pawl is resting on the top of the vertical lever; and the mold in use should be in the right-hand vertical position.

If there is any doubt as to the machine's being at normal position, this can be verified by looking at the stop pawl or noting mold position.

NO. 2—CASTING POINT HANG-UP

At this position the first elevator is resting on the top of the vise cap and the mold disk has turned one-fourth revolution bringing the mold to a horizontal position.

The first elevator goes down to casting point by its own weight; therefore when it stops, the operator should shut off the control lever, raise the elevator and look for possible obstructions. He should remove the plunger pin as a precautionary measure.

The following obstructions can prevent the elevator from seating properly:

a—The knife wiper bracket screws working loose.
b—Mats falling in the vise jaws where elevator sits.
c—Mats falling between the rod lip and "dog" or plunger of vise automatic.
d—Screws working loose under the first elevator front jaw, and striking on the vise jaws.
e—Line stop being dislodged from the elevator jaws.
f—Gibs of first elevator being too tight.
g—The need of lubrication of the first elevator slide.
h—Vise jaws guard binding at the first elevator.

NO. 3—MOLD DISK STUDS HANG-UP

If the machine stops before the disk wheel goes upon the locking pins, the first thing to do is to look for obstructed studs due to the disk's being out of time.

After the "hang-up" is verified, it will then be necessary to open the vise and retime the disk spot with spot of the pinion wheel.

The trouble has been caused by improper timing of the

disk by operator, after having the disk out.

When the machine leaves the factory, the mold disk and pinion wheel are both marked or spotted for the purpose of retiming disk properly.

NO. 4—MOLD DISK CAM LEVER HANG-UP

This stop often occurs with beginners. The machine starts as usual, the Mold Disk advances on the studs, but the machine comes to a stop when the long segment tries to turn the mold disk.

This trouble or "hang-up" is generally caused by the operator's having left the mold cam lever down after having pulled out the disk for some purpose or other.

Whenever the mold cam lever is left disconnected the pot forces the disk studs on the vise bushings, where it remains. This prevents the disk from being turned by the cam and stops the machine.

To undo this hang-up, either back the machine slightly or push the mold disk back until the outside face of the disk lines up with the face of the hand-wheel. This done, connect up the mold cam lever again.

NO. 5—BACK SQUIRT HANG-UP

Machine at this position will indicate a back squirt on the edge of the mold disk which will stall the machine at, or near, this position.

The No. 5 position is sometimes hard to judge quickly due to the different fractional positions at which this trouble may occur.

When this trouble occurs the operator can note the position of the roller on the first cam and if the roller is between the No. 5 and No. 7 position he can then look back of the disk for metal,

Remedies for back squirt hang-up are as follows:

a—Back up the machine slightly until the disk turns back-

ward so that the metal on the disk rim can be dug out. This done, let the machine come to normal position so that the squirt can be cleaned off and the disk retimed properly. Attention must be given to regulation of pot heater, should this be necessary.

Where the machine cannot be backed for removal of metal, it will be necessary to do the following:

a—Disconnect the mold cam lever.
b—Tie up the ejector pawl, or have someone hold it up.
c—Pull out the disk hand-wheel with the left hand, and at the same time pull the control lever and let the machine come to normal.
d—After the machine is around to normal position, clean out the metal and retime the spot on the disk with the spot on the hand wheel.

NO. 6—TRANSFER HANG-UP

This stop or hang-up is indicated by the machine stopping at the transfer position, (both first and second elevators at the same point) with the matrices only partly transferred from the first to the second elevator.

When this trouble occurs, the operator can quickly judge it by looking at his matrix line in the first elevator.

Push the control lever in and don't open it until the trouble has been remedied.

The trouble is generally caused by one of the following:

a—Failure to remove the casting block after recasting a "bold-face" line.
b—-Failure to unlock spaceband lever after recasting.
c—Front squirt in the elevator jaws, which prevents the matrices from transferring to the second elevator.
d—Bent condition of the first elevator back jaw, which would bind the matrices in transferring.
e—Need of adjustment at the transfer point of the first or second elevator.

f—Second elevator obstruction.
g—Burred or smashed toes or ears of the matrices binding in jaws.
h—Elevator transfer slide finger screw and spaceband lever pawl hinge bushing pin working loose and obstructing carriage.
i—Vise automatic stop rod lever assembled improperly.

The remedies for the transfer hang-up follow:

CAUTION—*Push in stopping lever handle.*

a—Pull back and lock spaceband pawl lever. Push matrices and spacebands on the first elevator jaws. Press down on first elevator slide and push recasting lever block to extreme left.
b—Same as above.
c—Shut off power and bring machine to normal position by turning clutch by hand. Clean jaws with brass rule and make sure duplex rail is working freely.
d—Try to transfer the line from the first elevator jaws to the second elevator by hand. If this cannot be done, push the line back into the first elevator and bring the machine to normal position. Remove the jaws and put two blocks of wood on the back jaw of the bench vise and one on the front jaw. Place bent elevator jaw between blocks and turn bench vise handle until the jaw is straightened out. Test with straight-edge rule.
e—Use a thin "pi" matrix on the first elevator jaw while machine is at transfer position. Lock spaceband lever and place a white piece of paper under the drop light. Look through first elevator from outside of face plate end. Matrix must pass freely from first elevator to second elevator. Light must be seen around all seven teeth of matrix. There must be clearance between the front jaw and the matrix and the back jaw and the matrix. This condition is obtained by the adjusting screw and nut at the inside of the bottom of the first elevator slide.
f—Be sure that no grit or dirt is on intermediate channel

plate seat. Spacebands put in intermediate plate by operator wrongly will obstruct the transfer.

g—Remove all burred matrices and damaged spacebands.

h—Pull back elevator transfer slide and tighten screw securely. Tighten set screw over spaceband lever pawl hinge bushing pin.

i—Vise automatic stop rod lever should always be over the top of pin in vise automatic stop rod. If placed under the pin, the automatic rod will not be pulled down when machine is at transfer position. Stop rod not being pulled down at this position will cause the disk dog to bear against the pawl in the stop rod which forces the lower end of the stop rod against the stop lever. The stop lever will bear against the upper stopping lever causing the machine clutch to be thrown out of action.

CAUTION—Be sure of all transfer position stops or hang-ups, because there are several hang-ups that occur at this position, other than matrix obstructions.

NO.7—STUCK SLUG OR EJECTOR HANG-UP

Machine at this position may indicate a stuck slug or ejector b!ade obstruction; also the side knives being closed or too tight for slug,

When the machine stops at the No. 7 position, the operator should note the position of matrices. The line should be in a transfer position on to the second elevator, before he looks for knives or ejector obstructions.

An ejector hang-up can always be verified by looking at the ejector pawl and cam lug, to see that the pawl is up against the lug. Remedy for the above hang-up is to release ejector pawl and allow the machine to come to normal position, at which time the obstruction can be removed. Do not jerk the control lever.

Ejector pawl is adjusted too low. To remedy this trouble raise the pawl by screwing in on the adjusting screw.

MACHINE PARTS

Every linotype operator-machinist should know the parts of the machine with which he works. Following is a list of the essential parts of the linotype together with a short description of their functions.

1—ASSEMBLER. This is where the matrices enter the assembling elevator as they are brought into line.

2—ASSEMBLER SLIDE. This is the part which advances when the matrices enter the assembling elevator.

3—ASSEMBLING ELEVATOR is that part of the machine where the matrices and spacebands assemble, and in which they are raised to the line delivery carriage, which carries them to the first elevator.

4—INTERMEDIATE CLUTCH is that part which stops and starts the star wheel.

5—RELEASING WIRE is the vertical wire found on the right of the back rail of assembling elevator and is for the purpose of raising the latch to release the line delivery slide,

6—LINE DELIVERY CHANNEL is that part through which the line passes from the assembling elevator to the first elevator.

7—LINE DELIVERY CARRIAGE AIR PUMP is attached to the frame at the back of the machine and regulates the speed of the line delivery carriage by acting as an air cushion.

8—LINE DELIVERY ROLLER ARM is that part of the machine which kicks off the stop pawl and allows the machine to start. It is operated by the line delivery carriage lever and spring.

9—FIRST ELEVATOR is that part of the machine which receives the matrices from the assembling elevator and takes them to the casting and transfer positions.

10—FIRST ELEVATOR JAWS (front and back) are located at the head of the first elevator and are the parts which receive the matrices from the assembling elevator and hold them while the line is casting or transferring.

11—FIRST ELEVATOR CONNECTING LINK is that part connecting the first elevator lever to the first elevator. It contains a compression spring which allows the toes of the matrices to align easily in the grooves of the mold. It is also used to raise or lower the first elevator a trifle to regulate the transfer of the matrices. This adjustment is to be made at normal position only.

12—FIRST ELEVATOR LEVER is the lever that is connected to the first elevator link at the front of the machine and to the first elevator cam at back of the machine.

13—FIRST ELEVATOR GUIDE is that part which keeps the first elevator true at the transfer position.

14—TRANSFER CHANNEL is that part where the matrices are transferred to the second elevator.

15—TRANSFER SLIDE is that part under the first elevator guide which transfers the matrices into the second elevator.

16—TRANSFER ROLLER ARM is that part of the machine which kicks off the safety pawl provided there is no obstruction to proper transfer.

17—SECOND ELEVATOR is the arm that swings down from the end of the distributor bar and receives the matrices from the first elevator and carries them up to the distributor.

18—SECOND ELEVATOR CAM LEVER is that part

chine which receives the slug after it has been cast and has been ejected from the mold.

46—JUSTIFICATION LEVER is a straight lever under the pot and mold disk, which justifies the matrix line by pushing up the spacebands, assisted by the vise closing levers.

47—SPACEBAND BOX is located in front of machine and in which the spacebands are located.

48—MAIN FRICTION CLUTCH is located inside driving pulley. It is the driving power of the machine.

49—FIRST ELEVATOR CAM LEVER is the lever at the left, back of machine, (judge from the front of machine) and is connected to the long lever which operates first elevator slide.

50—CONTROL LEVER is handle in front of machine; when pushed in will stop machine at any position.

51—SPACEBANDS are steel wedges used between the words of a line to justify or spread line to required width. In an assembled line they project below the matrices.

52—KEYBOARD CAMS (ninety-one in number) connects with the keyrods, which release the matrices and spacebands and make a complete revolution every time the button is pressed.

53—THE ESCAPEMENT PAWLS are the parts which release the matrices from the magazine. They are in the lower end (front) of the magazine.

54—THE VERGES are small brass levers under the lower end of the magazine and hold the pawls.

55—DISTRIBUTOR CLUTCH is that part of the distributor located at the end of the spirals, and its purpose is to turn the distributor screws.

56—THE EJECTOR is the sectional blades inside the mold disk slide.

57—THE FIRST ELEVATOR FILLING-IN PIECE, or the "flap," is the part under the first elevator on the vise cap. It has a handle for turning back and forth. Must be used with display molds.

FIFTY ADJUSTMENTS ON THE LINOTYPE

In Making the First Seven Adjustments, Be Sure That Automatic Pawls are Off the Upper Stopping Lever And the Starting Lever is Open To Operating Position.

1. MAIN CLUTCH—Allow 15-32 of an inch between collar and machine bearing. On all machines lower than 5515 use adjusting nuts on outer end of clutch rod. Machines above 5515 adjust by packing paper under clutch leathers.

This is where the power is applied and it is connected to the cam shaft by gears that are 11 to 1, and give one revolution of the cam to 11 of the clutch.

2. AUTOMATIC PAWLS—Set 15-16 of an inch from the edge of the cam. Use adjusting screw in automatic pawls. The Stop Pawl is to stop the machine after it has made one revolution. The Safety Pawl is to stop the machine if for any reason the line has not transferred.

3. AUTOMATIC STOP PAWLS—Set 1-4 of an inch on upper stopping lever. Use set screw on top of vertical lever. This pawl is for stopping the machine in normal position. The action is to push down on the upper stopping lever, forcing the lower stopping lever against the forked lever, which in turn pushes against the collar that is fastened to the clutch rod, the other end of which is connected to the clutch. In doing this the clutch is thrown out of action and the machine is stopped.

4. LOWER STOPPING LEVER—Allow 1-32 of an inch between the lower stopping lever and fork lever. Use adjustment screw in upper stopping lever. This lever is the connection between the upper stopping lever and the fork lever to get a horizontal motion from a vertical action.

5. VERTICLE LEVER—Should force automatic pawls 1-16 of an inch clear of upper lever. Use adjusting screw on outside of verticle bearing. This lever is only in action when starting lever is pulled by hand. The eccentric screw in the starting rod, pulled against the lower lug, of the vertical lever forces it around, causing the upper lug to push off the automatic pawls, which release the clutch, letting the machine go into action.

6. VERTICAL LEVER—Allow 1-64 of an inch between the upper lug and automatic stop pawl. Use adjusting screw inside of column. This lever returned by a spring and stops against the adjustment screw and should move freely.

7. STARTING LEVER—Allow 1-32 of an inch between eccentric screw and vertical lever lower lug. This lever controls the machine. When part way out and standing free the machine is in operative position; when pulled all the way out it will start the machine.

8. TIE ROD—To make the head bear lightly against the bracket. This rod is held in place by a locking screw. This bolt takes up the strain when the pot locks up.

9. MOLD TURNING CAM—The steel shoes to take up the lost motion in pinion. Adjust by screw bushings in cam. This is to position the mold disk in casting and ejecting position so locking studs will enter bushings.

10. MOLD TURNING BEVEL PINION—Screw to be on top when cams are in normal position. This pinion turns the mold disk and gets its power from the segments in the cam. The short segment gives one-quarter turn, bringing the mold in casting position; the long segment gives three-quarter turn carrying the slug past the back knife, which trims the slug to type high; it then goes to ejecting position.

11. MOLD DISK LOCKING STUD BLOCKS—Leave blocks loose, pull mold disk forward on pins or bushings with 30-em blade through mold; tighten blocks and mold will be adjusted square with vice.

12. GIBS ON VISE FRAME—Adjust first elevator so elevator will stand square with mold. Test by placing a thin matrix in each end of first elevator, pull mold forward over toes of matrix, raise elevator by hand. If matrices are tight, alignment is correct; if not, adjust gibs.

13. FIRST ELEVATOR—To just clear the transfer and delivery channels. Adjust by gibs on vise frame. This elevator carries the line to the mold, and after the cast carries it up to the transfer channel.

14. FIRST ELEVATOR CONNECTING LINK—Allow 3-4 of an inch at the top and 13-16 of an inch at the bottom from holes to shoulders. Adjust by link screws. This link has a spring inside of it that compresses when the alignment is made. Then align first elevator with grooves in line delivery by screw in auxiliary lever.

15. FIRST ELEVATOR—Allow 1-64 of an inch between adjusting screw and vise cap when first elevator lifted for alignment. Adjust with center screw at top of elevator when matrix toes are in the mold. This is the alignment of matrices and is important.

16. FIRST ELEVATOR—Align with transfer channels so that the matrices will pass freely to the second elevator. Adjust with screw on bottom of first elevator slide, right side.

17. MOLD SLIDE—To bring mold .01 of an inch from vise jaw or line. Adjust eccentric pin in mold slide lever (pin with lever attached). This is to bring the mold over the toes of the matrices so that the alignment can take place. The mold must not strike the line, or it will prevent proper justification. The position to make this adjustment is when the pot is just ready to move forward. To have .007 of an inch play between slides and ways. Adjust by two square-headed screws under the gibs (on machines lower than 14228). Bushings to go on pins without friction. Adjust by screw under mold disk guide.

18. SECOND ELEVATOR—When the elevator is at transfer point, roller should be free of cam. Adjust by connecting bolt in second elevator lever. This is to assure the elevator going to its proper position for the line to transfer.

19. SECOND ELEVATOR STARTING SPRING—When elevator is at transfer point, adjusting nut should touch spring. The spring is to start the elevator down and prevent sticking at the distributor.

20. ELEVATOR TRANSFER LEVER—Allow 5 9-16 inches from the intermediate or transfer channel to slide finger (6 9-16 on Models 6 and 7). Adjust by eccentric pin in transfer lever in all machines lower than 6282. All machines above 6282 are adjusted by moving split lever on shaft. This is the lever that transfers the line from the first elevator to the second elevator.

21. SPACEBAND LEVER—The spaceband pawl should pass point of spaceband box rails. Adjust with turnbuckle that connects with the transfer lever. This lever returns the spacebands to the box.

22. ELEVATOR TRANSFER SLIDE—Allow 1-8 of an inch between slide finger and the bottom slot in spaceband pawl. Adjust screw in transfer slide. The slide and finger push the spacebands under the pawl so that the pawl can return them to the box.

23. ELEVATOR TRANSFER SLIDE—Cut in slide fingers to be flush with end of second elevator bar plate. Adjust by screw in automatic safety pawl. This is when the line is transferred to the second elevator bar. The cam roller works the automatic safety pawl buffer, which forces the pawl clear of the upper stopping lever.

24. DELIVERY SLIDE—The slide should go far enough back to just catch in the second notch of the pawl. Adjust by eccentric pin on all machines lower than 6282; machines above 6282 adjust by split lever on shaft. This is to bring the carriage back so that when a line is raised by the assembling elevator, it will not strike the short finger.

25. LINE DELIVERY CARRIAGE—To stop 13-32 of an inch inside of first elevator. Adjust on all machines under 6282 by washers in air cushion cylinder; on all machines over 6282 by stop screw on face plate. This adjustment is to carry the matrices inside the first elevator jaw retaining springs, which keeps them from falling out. chine when the carriage stops against the stop screw on

26. LINE DELIVERY CARRIAGE—To start the maface plate. Adjust plate on automatic pawl. The starting

of the machine is done by the delivery roller forcing the automatic stop pawl off the upper stopping lever.

27. MOLD DRIVING PINION SHAFT FRICTION CLAMP—To take up lost motion in the mold disk. Adjust screw in clamp. This is to keep the disk from running past the locking stud blocks.

28. VISE AUTOMATIC DISK DOG OR PLUNGER—To just clear automatic stop rod. Machine to be stopped by thin space placed under center screw of first elevator. This is to stop the machine in case the first elevator does not come down to proper position. The disk dog pushes against the automatic stop rod, forcing it out; the bottom end, coming in contact with the stop lever, acts on the connecting rod, which, in turn, pushes the forked lever against the collar that is connected to one end of the clutch rod, the other end of the rod being connected to the clutch. This causes the clutch to be thrown out of action and stops the machine.

29. METAL POT—Mouthpiece holes to align with smooth side of slug. Adjust with top and bottom screw in pot legs. Square pot with front and back screws when using gauge.

30. POT LEVER EYE BOLT—On all machines lower than 5293 there should be 1-16 of an inch between the nut and pot lever when spring is compressed. All machines above 5293 have pipe riveted to the screw and nut should be against pipe. This gives the lockup to the pot and takes up all excess friction.

31. BACK KNIFE—To set square and press lightly against the mold. Adjust by two square-headed screws back of knife. The slug passes in front of the knife, which trims it to type high.

32. FIRST ELEVATOR SLIDE GUIDE—Releasing lever to clear transfer slide 1-32 of an inch. Adjust by screw in second elevator. This lever is to keep the matrices from transferring if the second elevator does not come down in position.

33. FIRST ELEVATOR INTERMEDIATE BAR—When pawl is raised, it should be flush with second elevator bar. Adjust with two screws in top cap. This pawl is to push down the spacebands when transferring.

34. EJECTOR BLADE—When the blade advances, it is to be flush with chase channel. Adjust screw in ejector lever pawl. This is where the slug is pushed out of the mold between the trimming knives and the chase channels.

35. ASSEMBLING ELEVATOR—Starting pin to release the delivery carriage just as latch catches. Adjust with screw under starting pin. This small pin is what starts the machine by releasing the carriage, which is carried to the first elevator to deliver the roller which comes in contact with the automatic stop pawl, forcing the pawl off the upper stopping lever allowing the clutch to go into action.

36. ASSEMBLING ELEVATOR—To be returned by its own weight. Adjust by counter-balance spring screw hook in keyboard frame. This is to make the elevator fall easily by balancing it so that it will just fall into position.

37. ASSEMBLER—The chute spring to throw the bottom of the matrices toward the star wheel to allow the cap "W" to go between it and the rails. Adjust by bending spring. The star wheel to slip on tight lines. Adjust the friction spring. Buffer strips to be flush with detaining plates. Adjust by loosening the screw under the bracket and moving the strips forward. The catch spring to prevent matrices from falling backwards. Adjust by bending the spring so that it will go flush with casting when pushed by matrices.

38. MATRIX DELIVERY BELT—To be kept tight. Adjust by pulling idler pulley back. This carries the matrices from the assembler entrance to assembling elevator.

39. SPACEBAND BOX—The pawls must go 1-32 of an inch below the box rails. Adjust by screw in pawl lever. These pawls lift the spacebands over the rails, allowing them to fall into assembler.

40. SPACEBAND BOX CENTER BAR—One spaceband should be released at a time. Adjust by screws in center bar. This allows but one spaceband to pass between it and the points in the spaceband box rails.

41. ASSEMBLER SLIDE BRAKE—To release just before the time delivery starts. Adjust by screw in operating lever. This brake holds the slide when it is being assembled and releases to bring slide back into position. The outer end of the operating lever is forced up by the assembling elevator when it is raised and releases the brake. When the elevator descends, the lever is forced down, setting the brake for another line.

42. DISTRIBUTOR BOX LIFT—To lift matrices 1-32 of an inch above the rails in the distributor box. Adjust screw in cam lever. This lifts the matrices into the distributor screws, one at a time. The screws carry them along the rails until the bar is reached, when they transfer to the bar.

43. DISTRIBUTOR BOX—Matrices to pass freely from rails to bar. Adjust by screw in top of distributor bar. The matrices travel along this bar until they come to their proper places, when they fall into the magazine.

44. SPIRAL AUTOMATIC DISTRIBUTOR STOP—The first upper distributor screw and the lower distributor screw have upon them two rotary wedges. These wedges are fastened to the screws and are so set that the thin edge of one wedge is opposite the thicker portion on the ditributor screw. The distributor screws will revolve as long as the distributor screws are in a certain relation to each other. The threads of the distributor screws pass one another and the distributor screws will revolve. The friction putting the lower distribution screw out of time with the upper one is caused by the pressure against a mat that fails to fall into the channel entrance. To start distribution, just remove the mat that has caused the stop, then turn the lower distributor screw slightly backward by small hand wheel; threads will then be in time, and, by lifting the latch, the clutch is released and the distributor will start.

45. KEYBOARD UPPER GUIDE—Rods to lock in verges without striking side partitions. Adjust with screw bushings in intermediate bracket. (No. 3 and 5 machines only). This is to locate the key-rods with verges, so that they will work freely and not bind on the side partitions.

46. THERMOSTAT GAS GOVERNOR—To lower temperature turn the dial to left, to raise temperature turn dial to right. The part of the thermostat which is immersed in metal is cast-iron and has a hole or pocket in it in which is a rod of composition metal, the upper end of which operates a lever, due to the expansion of the rod and being greater than the cast iron and the lower end pushing against the bottom of the hole or pocket. The lever in turn at its other end operates a valve which closes the gas inlet when the heat from the metal expands the rod, and as it contracts the gas inlet is again opened.

47. TRIMMING KNIVES—To trim the slugs to size and parallel. Adjust left-hand knife to trim overhang from the smooth side of slug with two square-headed screws in vise frame. Right-hand knife by two slotted screws in knife block. Old machines held by two square-headed screws in front of knife block.

48. VISE JAW—To bring face of type .01 of an inch from each end of slug. Adjust screw in top of knife block for short jaw and locking screw in vise closing arm bracket for long jaw. This is to position the type on slug so there will be no shoulder sticking over.

49. PUMP STOP—To have 1-32 of an inch between stop lever and stop. Adjust by screw in pump stop operating lever. This is to prevent a line from casting if it is not properly justified.

50. FIRST ELEVATOR LINE STOP—To be set 1-8 of an inch from line after line is justified clamped by screw in first elevator jaw. This stop is to prevent the matrices from falling out of the elevator, or to prevent them from twisting when the elevator is carrying them up.

CAUTION—*Students are warned not to change adjustments on the machines in their shop.*

THE POINT SYSTEM

The point system adopted by typesetting machine manufacturers is on the basis of .01388″ to the point setwise, or .1666″ to the pica. Accordingly 6 ems are exactly one inch long.

Decimal point measurement of a slug is .014″ to the point.

Type high measures .918″.

Type sizes in points and thousandths of an inch.

Name of type	Points	Thousandths
Excelsior	3	.042
Brilliant	3½	.049
Diamond	4½	.063
Pearl	5	.070
Agate	5½	.077
Nonpareil	6	.084
Minion	7	.098
Brevier	8	.112
Bourgeois	9	.126
Long Primer	10	.140
Small Pica	11	.154
Pica	12	.168
English	14	.196

Comparisons with American point system

Em	.1666″
Cicero	.178″
Fournier	.16476″
Petit	.1115″
Didot	.014833″
Point	.014″
Point Fournier	.01373″

The Cicero is the unit of measurement used in Europe.

A Point, American system measures .014″

An Em, American system measures .16666″

A Point, European system measures .01433″

An Em (Cicero) European system measures .178″

Therefore, a 30 Em slug in America would be equivalent to a 28 Cicero slug in Europe.

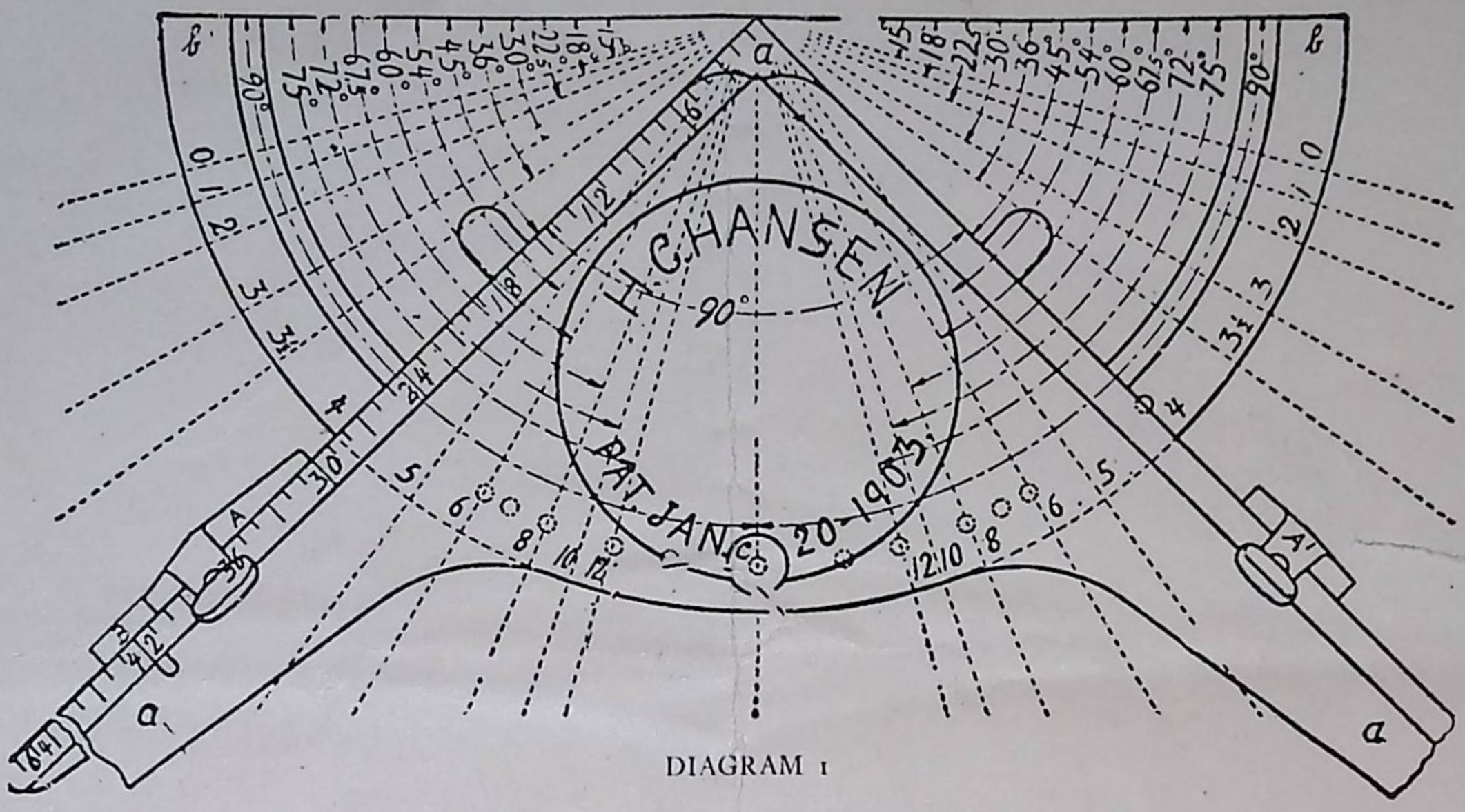

DIAGRAM 1

MITERING

To miter a square—angle 90 degrees—place the brass rule supporter **aaa** in the center of bed **bb** on the mitering machine, the adjusting pin **c** in the center hole, leaving Figure 4 on the bed in view on each side of the supporter, indicated in diagram 1. In that position each end of the rule can be mitered to 45 degrees without any change of the supporter.

When it is desired to miter any one of the designs shown in Diagram 2, take the degree from the desired design and find the corresponding degree in Diagram 1, and place the supporter on dotted line corresponding with the figure on the mitering machine, as indicated in Diagram 1. For instance, if you wish to miter an octagon, as indicated in Diagram 2, Figure F, each end of the rule to be mitered 67½ degrees, place the supporter to the right, leaving Figur 8 in view on the mitering machine, and miter the first ends of the rules. Then turn the supporter so that Figure 8 be in view at the left hand side of the mitering machine, and miter the other ends to length, which will give the miters perfect for any size eight-sided design. The outer circular edge on the bed of the mitering machine is marked with numbers 1, 2, 3, 4, 5, 6, 8, 10, and 12, which as indicated in Diagram 1, correspond to 18, 22½, 30, 45, 54, 60, 67½, 72 and 75 degrees respectively.

Figures 0 and 3½ on Diagram 1, correspond to 15 and 36 degrees, illustrated by Figures H and R on Diagram 2.

When it is desired to miter a diamond, place the supporter to the desired degree for one end of the rules, and the supporter in the same position will be correct for the opposite end of the rules.

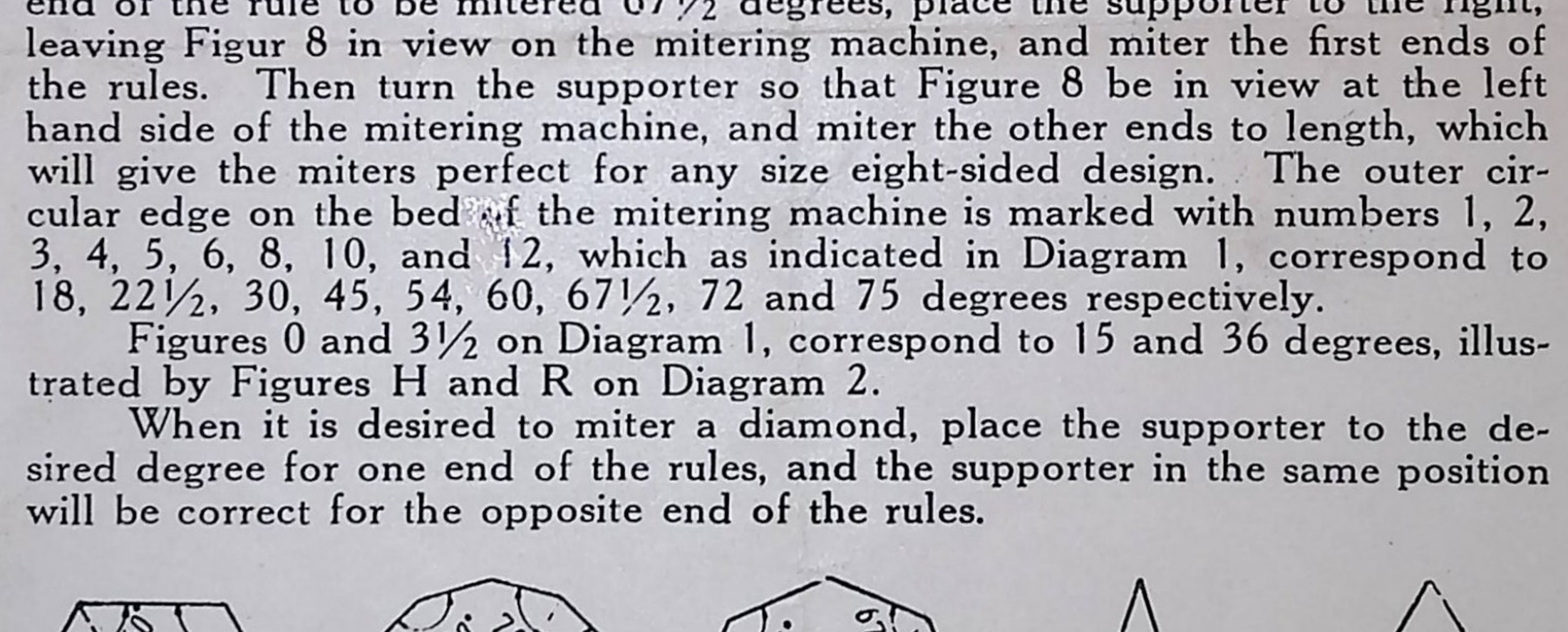

DIAGRAM 2

The School for Printers' Apprentices
220-230 West 19th Street
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